TYAN

Thunder K8HM / / / **S3892**

Version 1.0

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Check the box contents!

The retail motherboard package should contain the following:

1x Thunder K8HM motherboard

1x 34-Pin floppy drive cable

4 x SATA cable

2 x SATA Drive Power Adapter

1 x Ultra-DMA-100/66 IDE cable

1 x USB2.0 cable

1 x COM Port cable

1 x Thunder K8HM User's Manual

1 x Thunder K8HM Quick Reference Guide

1 x TYAN driver CD

1 x I/O shield

2 x CPU Retention Frame

If any of these items are missing, please contact your vendor/dealer for replacement before continuing with the installation process.

NOTE

Chapter 1: Introduction

1.1 - Congratulations

You have purchased one of the most powerful server solutions available. The Thunder K8HM (S3892) is a high-end server motherboard, based on the ServerWorks BCM5780 & BCM5785 chipsets. It also includes the NS PC87417 Super I/O and SMSC EMC6D 103S Hardware Monitoring chipsets.

This motherboard is designed to support up to two AMD Opteron ™ 200 Series processors and 16GB/32GB of DDR400/333 memory. The S3892 is ideal for CPU, memory, and network intensive applications required in the HPC and clustering environments.

Remember to visit TYAN's Website at http://www.tyan.com. There you can find information on all of TYAN's products with FAQs, online manuals and BIOS upgrades.

1.2 - Hardware Specifications

Processors
- Two uPGA 940 -pin ZIF sockets
- Supports up to two AMD Opteron™ 200 Series processors (including dual core processors)
- Integrated 128- bit DDR memory controller

Chipset
- ServerWorks BCM5780 + BCM5785 chipsets
- National PC87417 Super I/O chip

Memory
- 128-bit dual channel memory bus
- Total sixteen (16) 184- pin 2.5V DDR DIMM sockets (8 on CPU1 and 8 on CPU2)
- Supports PC1600/2100/2700
- Registered, ECC/Non-ECC module supported

Expansion Slots
- Two (2) PCI Express X16 slots (each w/ x8 signal)

Integrated Video Controller
- ATI ES1000 controller
- 32MB DDR frame buffer

Integrated Enhanced IDE Controller
- Integrated Enhanced IDE Controller
- Single-channel master mode supports up to two IDE devices
- Supports IDE drives and ATAPI- compliant devices

Integrated SATA Controllers
- Supports four SATA-II ports at 3.0 Gb/s (BCM5785 Chipset)
- RAID 0/1/5 supported

Integrated LAN Controllers
- Dual GbE LAN (from BCM 5780)
  - Embedded in BCM5780
  - Two 10/100/1000 RJ- 45 LAN ports w/LED
- One Intel i82551 QM fast Ethernet controller
  - One 10/100 RJ- 45 LAN port w/LED

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- Two (2) PCI-X 133/100MHz slots
- One (1) PCI-X 100MHz slot
- One (1) PCI 32-bit/33MHz, v2.3 compliant slot
- One (1) TYAN "TARO" SO-DIMM socket

System Management
- Two (2) EMC6D103S hardware monitoring IC
- Eight (8) 3+1 fan headers support tachometer monitoring, six (6) of them with smart FAN control
- Temperature and voltage monitoring
- Watchdog timer support

Integrated I/O
- One floppy connector
- One IDE connector
- Four SATA connectors
- Four USB2.0 ports (2 at rear, 2 via cable)
- Two COM ports (1 at rear, 1 via cable)
- Tyan 2 x 9 front panel pin header
- Tyan 2 x 6 front panel pin header for LAN/ID LED
- 2 x 25 connector for optional TYAN IPMI SMDC

Back Panel I/O Ports
- Stacked PS/2 Mouse & Keyboard ports
- Stacked 2 USB ports and 1 10/100 RJ45 port
- One 9-pin COM port
- One 15-pin VGA connector
- Two side-by-side RJ-45 ports

Form Factor
- Extended ATX footprint (13" x 12")
- EPS12V/SSI v3.51 (24+8) power connectors

- Operating on 32bit/33MHz PCI bus

Optional Modules
- M3291, IPMI 2.0 Remote System Mgmt card
- Renesas H8S2167 BMC controller
- BT, KCS, Logging support
- IPMI-over-LAN
- Remote power on/off and reset

- M7901/M7902, Ultra 320 SCSI TARO card
- Adaptec AIC-7901/7902 single/dual-channel Ultra 320 SCSI controller
- Adaptec Host RAID 0, 1, 10 supported

- M9000 SAS/SATA II TARO card
- Adaptec AIC-9405/9410 SAS controller
- Supports up to 4-port (M9000-5) and 8-port (M9000-10) SAS & SATA running at 3.0Gb/s
- Adaptec HostRAID 0, 1 & 10 supported

BIOS
- AMI BIOS on 8Mbit LPC Flash ROM
- Serial Console Redirect
- PXE via Ethernet, USB device boot
- SMBIOS 2.3.1, BBS 1.1 compliant
- Headless Operation via serial console redirect
- 48-bit LBA Support

Power
- Onboard dual 4-phase VRM
- EPS12V/SSI v3.51 (24+8) power connectors

Regulatory
- FCC Class B (DoC), CE (DoC)

Chapter 2: Board Installation

Precautions: The Thunder K8HM supports SSI, EPS12V type power supplies (24pin + 8pin) and will not operate with any other types. For proper power supply installation procedures see page 37.

DO NOT USE ATX 2.x or ATXGES power supplies as they will damage the board and void your warranty.

How to install our products right… the first time

The first thing you should do is reading this user's manual. It contains important information that will make configuration and setup much easier. Here are some precautions you should take when installing your motherboard:

(1) Ground yourself properly before removing your motherboard from the antistatic bag. Unplug the power from your computer power supply and then touch a safely grounded object to release static charge (i.e. power supply case). For the safest conditions, TYAN recommends wearing a static safety wrist strap.
(2) Hold the motherboard by its edges and do not touch the bottom of the board, or flex the board in any way.
(3) Avoid touching the motherboard components, IC chips, connectors, memory modules, and leads.
(4) Place the motherboard on a grounded antistatic surface or on the antistatic bag that the board was shipped in.
(5) Inspect the board for damage.

The following pages include details on how to install your motherboard into your chassis, as well as installing the processor, memory, disk drives and cables.

NOTE	DO NOT APPLY POWER TO THE BOARD IF IT HAS BEEN DAMAGED.

2.1 - Board Image

This picture is representative of the latest board revision available at the time of publishing. The board you receive may or may not look exactly like the above picture.
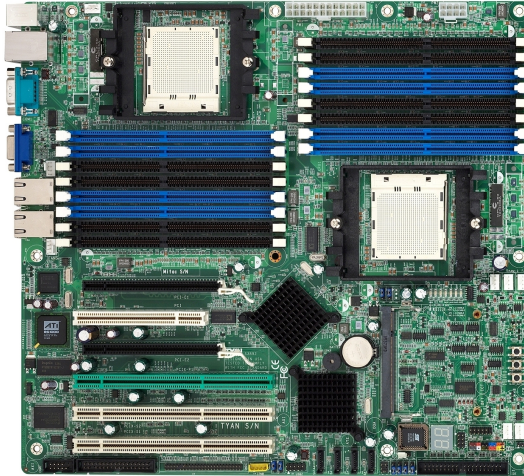
The following page includes details on the vital components of this motherboard.

2.2 - Block Diagram
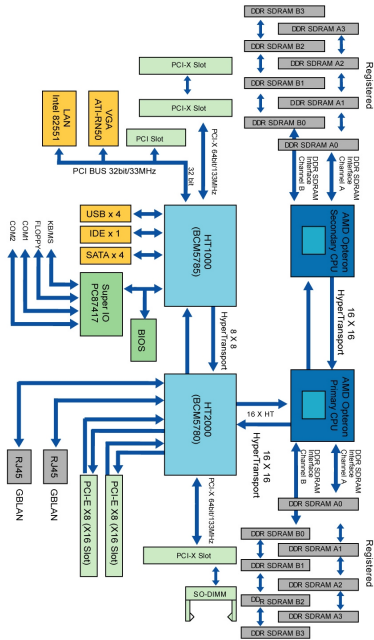
Thunder K8HM (S3892) Block Diagram

2.3 - Board Parts, Jumpers and Connectors
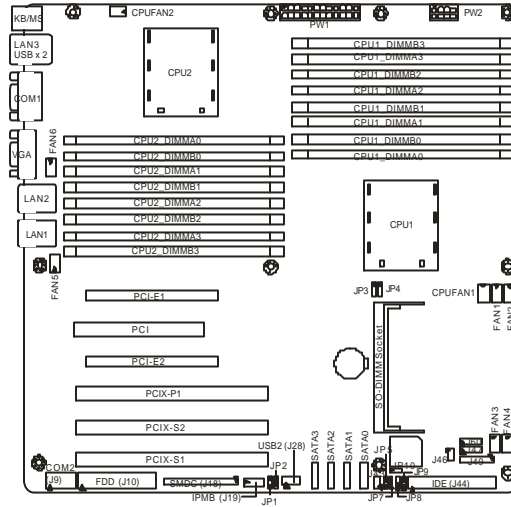
This diagram is representative of the latest board revision available at the time of publishing. The board you receive may not look exactly like the above diagram.

Jumper Legend

▣ ▣	**OPEN** - Jumper OFF, without jumper cover
▣ ▣	**CLOSED** – Jumper ON, with jumper cover

Jumper/Connector	Function
FAN5/FAN6	4-pin Fan Connector
CPUFAN1/CPUFAN2/FAN1/ FAN2/FAN3/FAN4	4-pin Fan Connector with Speed Control
J19	IPMB Connector
J28	USB Front Panel Connector
J30/J39/J40/J41	SATA Connectors
J47	LAN & ID LED and ID Switch Connector
J49	Front Panel Header
JP1/JP2	SMDC/ASF2.0 Select Jumper (Close 1-2) Default, support ASF 2.0 (Close 2-3) support SMDC card
JP3	VGA Enable/Disable Jumper (Close 1-2) Default, enabled (Close 2-3) Disabled
JP4	LAN3 Enable/Disable Jumper (Close 1-2) Default, enabled (Close 2-3) Disabled
JP5/JP8	PCI-X Mode Select Jumper (Close 1-2) Default, Based on Card (Close 2-3) Force to run at PCI mode (only 66 or 33 MHz)
JP7/JP9	PCI-X Frequency Select Jumper (Close 1-2) Default, based on Card (Close 2-3) 100MHz or less
JP10	Clear CMOS Jumper (Close 1-2) Default (Close 2-3) Clear CMOS
J43/J46/J60	Reserved for OEM only
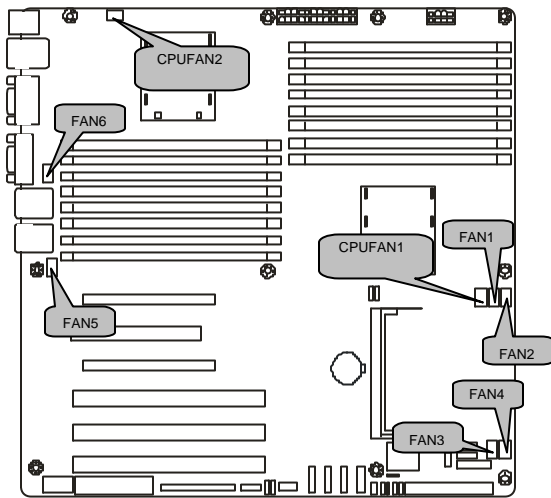
FAN1~4/CPUFAN1~2: 4-pin Fan Connector with Speed Control

CPUFAN1/FAN1~4

GND
+12V
Tachometer
PWM

CPUFAN2

PWM
+12V
GND
Tachometer
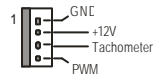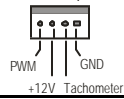
Use these headers to connect the cooling fans to the motherboard to keep the system stable and reliable.

This connector supports the tachometer monitoring and auto fan speed control.

Pin 1	Pin 2	Pin 3	Pin 4
GND	+12V	Tachometer	PWM

J13: CPUFAN2   J48: CPUFAN1   J50: FAN3
J51: FAN1   J56: FAN4   J57: FAN2

FAN5/FAN6: 4-pin Fan Connector

FAN5

NC
Tachometer
+12V
GND

FAN6

GND
+12V
Tachometer
NC
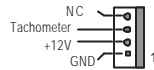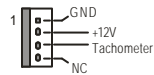
Use these headers to connect cooling fans to the motherboard to keep the system stable and reliable.

Pin 1	Pin 2	Pin 3	Pin 4
GND	+12V	Tachometer	NC

J7: FAN5   J8: FAN6

J9: COM2 Header

Use these pin definitions to connect a port to COM2.

Signal	Pin	Pin	Signal
DCD	1	2	DSR
RXD	3	4	RTS
TXD	5	6	CTS
DTR	7	8	RI
GND	9	10	KEY

J18: SMDC Connector

J33
CON25X2_M3291

1 LAD0	LAD1 2
3 LAD2	LAD3 4
5 GND1	LFRAME# 6
7 GND2	PCI_CLK 8
9 GND3	PCIRST# 10
11 GND4	I2C1CLK 12
13 I2C1DA	GND5 14
15 I2C4CLK	I2C4DA 16
17 GND6	I2C3CLK 18
19 I2C3DA	5VSB1 20
21 I2C2CLK	I2C2DA 22
23 5VSB2	GND7 24
25 PWRBTN#	PCIPME# 26
27 RSTBTN#	COM_TXD 28
29 OEMBTN#	COM_RXD 30
31 EXTSMI#	SOL_CTRL 32
33 CPUNMI#	GND8 34
35 SIO_RXD	COM_RTS# 36
37 SIO_TXD	COM_CTS# 38
39	SYSPWRGD 40
41 SIO_RTS#	
43 SIO_CTS#	OEMGPIO 44
45 SERIRQ	BMC_RST# 46
47 GND12	SMALERTA# 48
49 SMALERTB#	BMC_DET# 50

For connection with Tyan Server Management Daughter Card (SMDC). The SMDC connector is only compatible with Tyan M3291 (SMDC).

J19: IPMB Pin Header

Pin 1	IPMB DATA	Pin 2	GND
Pin 3	IPMB CLK	Pin 4	NC

J28: USB Front Panel Header

Use this header to connect to front panel USB connector.

Signal	Pin	Pin	Signal
USBPWR	1	2	USBPWR
USB3-	3	4	USB4-
USB3+	5	6	USB4+
GND	7	8	GND
KEY	9	10	GND

J42

J47

J49

J42: SO-DIMM Socket

	Connect SAS/SATA II Daughter Card (compatible with Tyan M9000 -10, M7901/7902 Ultra 320 SCSI "TARO" card).
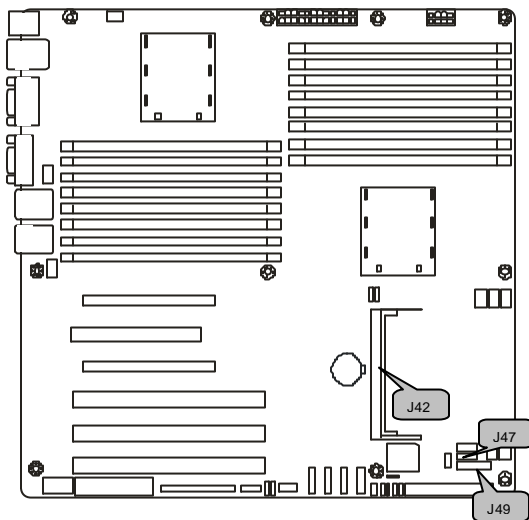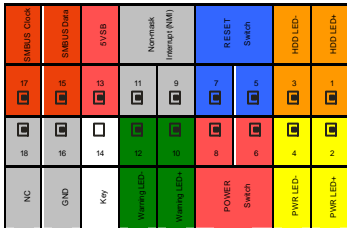
J47: LAN & ID LED and ID Switch Connector

Use these pin definitions to connect a port to LAN & ID LED and ID Switch.

Signal	Pin	Pin	Signal
LAN1 LED+	1	2	LAN1 LED-
LAN2 LED+	3	4	LAN2 LED-
LAN3 LED+	5	6	LAN3 LED-
ID LED+	7	8	ID LED1-
ID S/W+	9	10	ID S/W -
NC	11	12	KEY

J49: Front Panel Header

SMBUS Clock	SMBUS Data	5VSB	Non-mask Interrupt (NMI)		RESET Switch		HDD LED-	HDD LED+	
17	15	13	11	9	7	5	3	1	
18	16	14	12	10	8	6	4	2	
NC	GND	Key	Warning LED-	Warning LED+	POWER	Switch	PWR LED-	PWR LED+	

The motherboard provides one front panel header for electrical connection to the front panel switches and LED's.

JP1/JP2: SMDC/ASF2.0 Select Jumper

JP1 JP2 (1, 3 positions)	(Default) - Support ASF2.0
JP1 JP2 (1, 3 positions)	Support SMDC card

JP3: VGA Enable/Disable Jumper

1 / 3	(Default) - Enable VGA
1 / 3	Disable VGA

JP4: LAN3 Enable/Disable Jumper

1 / 3	(Default) - Enable LAN3 (Intel 82551)
1 / 3	Disable LAN3

JP5/JP8: PCI-X Mode Select Jumper

3 / 1	(Default) - Based on card
3 / 1	Force to run at PCI mode (only 66 or 33 MHz)
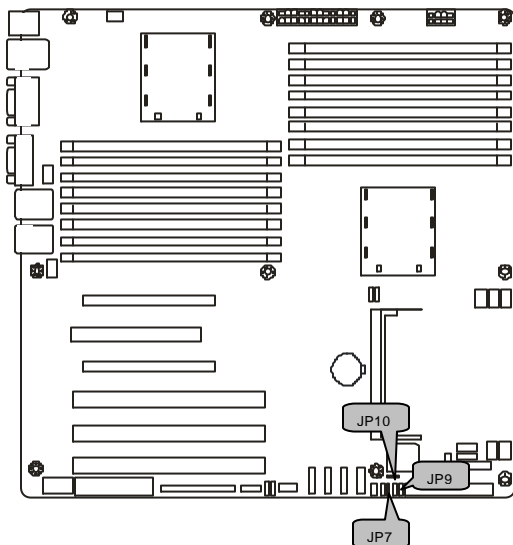
JP7/JP9: PCI-X Frequency Select Jumper

3 □□ □ 1 □	(Default) - Based on card
3 □ ■ 1 □	Force to run at 100MHz or less

JP10: Clear CMOS Jumper

3 □□ □ 1 □ (Clear)	If you have lost your system/setup password or need to clear the system BIOS settings. You can reset the CMOS settings by using this jumper.

Power off the system and set JP10 to (2-3) position, and then power on to boot up the system. The CMOS will be cleared when the screen is on. Finally shut down the power, replace JP10 to the default setting (1-2), power on the system again after done. |
| 3 ■
■
1 □
(Default) | |

2.4 - Installing the Processor(s)

Your brand new Thunder K8HM supports the latest 64 -bit processor technology from AMD. On ly the AMD Opteron™ processor 200 series are certified and supported with this motherboard. Check our website for latest processor support. **http://www.tyan.com**

| NOTE | If using a single processor, it MUST be installed in socket CPU1. When using a single processor only CPU 1 memory banks are addressable. |

TYAN is not liable for damage as a result of operating an unsupported configuration.
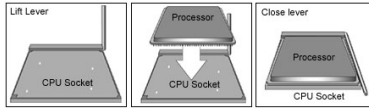
The diagram is provided as a visual guide t o help you install socket processors and may not be an exact representation of the processors you have.

Step 1: Lift the lever on the socket until it is approximately 90 $^{\circ}$ or as far back as possible to the socket.
Step 2: Align the processor with the socke t. There are keyed pins underneath the processor to ensure that the processor's installed correctly.
Step 3: Seat the processor firmly into the socket by gently pressing down until the processor sits flush with the socket.
Step 4: Place the socket lever ba ck down until it locks into place. The installation is finished.
Repeat these steps for the second processor if you are using two processors.

Take care when installing processors as they have very fragile connector pins below the processor and can bend a nd break if inserted improperly.

2.5 - Heatsink Retention Frame Installation

After you are done installing the processor(s), you should proceed with installing the retention frame and heatsink. The CPU heatsink will ensure that the processors do not overheat and continue to operate at maximum performance for as long as you own them. Overheated processors are dangerous to the motherboard.

The backplate assembly prevents excessive motherboard flexing in the area near the processor and provides a base for the installation of the heatsink retention bracket and heatsink.

Because there are many different types of heatsinks available from many different manufacturers, a lot of them have their own method of installation. For the safest method of install ation and information on choosing the appropriate heatsink, use heatsinks validated by AMD. Please refer to AMD's website at www.amd.com.

The following diagram will illustrate how to install the most common CPU back plates:

1. Mounting screws

2. Heatsink retention frame

3. CPU socket

4. Motherboard PCB

5. Adhesive insulator material

6. Backplate assembly
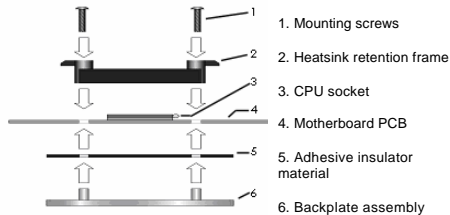
NOTE : Please see next section for specific instructions on how to install mounting bracket.

2.6 - Thermal Interface Material
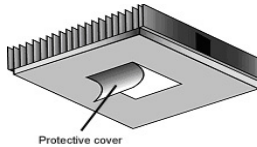
There are two types of thermal interface materials designed for use with the AMD Opteron processor.

The most common material comes as a small pad attached to the heatsink at the time of purchase. There should be a protective cover over the material. Take care not to touch this material. Simply remove the protective cover and place the heatsink on the processor.

Protective cover
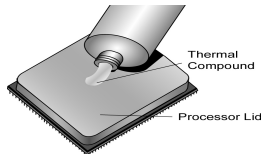
The second type of interface material is usually packaged separately. It is commonly referred to as 'thermal compound'. Simply apply a thin layer on to the CPU lid (applying too much will actually reduce the cooling).

Thermal Compound

Processor Lid

| NOTE | Always check with the manufacturer of the heatsink & processor to ensure the Thermal Interface material is compatible with the processor & meets the manufacturer's warranty requirements |

2.7 - Heatsink Installation Procedures

Type A: CAM LEVER (TYPE) INSTALLATION
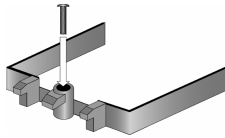
1. After placing backplate and interface material under motherboard place heatsink retention frame on top of motherboard. Align plastic retention bracket screw holes with CPU back-plate standoffs.
Tighten screws to secure plastic retention bracket. Repeat for the other side. **DO NOT OVER TIGHTEN.**
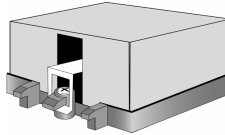
2. After tightening screws secure metal clip to plastic retention bracket center tab. Repeat for the other side of heatsink.
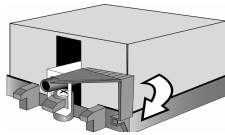
3. After securing metal clip to plastic retention bracket center tab, push down on plastic clip to lock plastic clip to side tab.

Type B: SCREW RETENTION TY PE HEATSINK
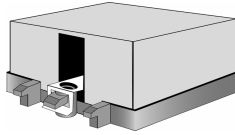
1. After placing CPU back-plate and adhesive interface material under motherboard, place heatsink retention frame on top of motherboard. Align heatsink retention frame screw hole with backplate assembly standoffs. Place heatsi nk inside plastic retention bracket. Place metal clip over retention frame tab. Repeat for other side.
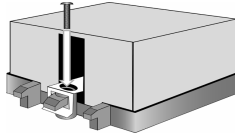
2. Insert screw through metal clip. **BE SURE METAL CLIP IS LOCKED ONTO RETENTION FRAME TAB.**
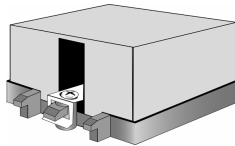
3. Tighten screw through metal clip. Repeat on the other side. **DO NOT OVER TIGHTEN.**

Finishing Installing the Heatsink

After you have finished installing the heatsink onto the processor and socket, attach the end wire of the fan (which should already be attached to the heatsink) to the motherboard. The following diagram illustrates how to connect fans onto the motherboard.

Once you have finished installing all the fans you can connect your drives (hard drives, CD-ROM drives, etc.) to your motherboard.

2.8 - Tips on Installing Motherboard in Chassis

Before installing your motherboard, make sure your chassis has the necessary motherboard support studs installed. These studs are usually metal and are gold in color. Usually, the chassis manufacturer will pre-install the support studs. If you are unsure of stud placement, simply lay the motherboard inside the chassis and align the screw holes of the motherboard to the studs inside the case. If there are any studs missing, you will know right away since the motherboard will not be able to be securely installed.

Pay attention when installing board in chassis. Some components are near the mounting holes and can be damaged.

Some chassis' include plastic studs instead of metal. Although the plastic studs are usable, TYAN recommends using metal studs with screws that will fasten the motherboard more securely in place.

Below is a chart detailing what the most common motherboard studs look like and how they should be installed.
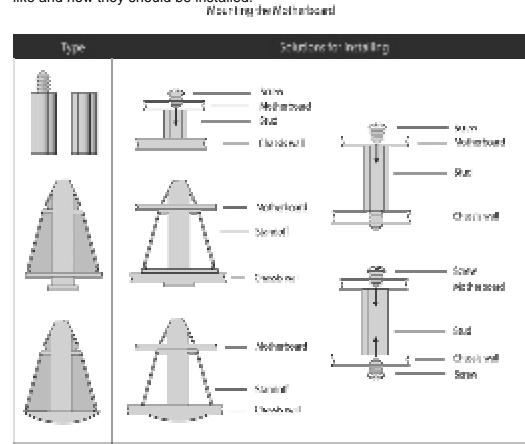
2.9 - Installing the Memory

Before attempting to install any memory, make sure that the memory you have is compatible with the motherboard as well as the processor.
The following diagram shows common types of DDR SDRAM modules:

DDR SDRAM

Registered DDR SDRAM

Registered memory has extra buffer chips near the bottom

Key points to note before installing memory into Thunder K8HM:

For optimal dual-channel DDR operation, always install memory in pairs beginning with CPU1_DIMMA3 and CPU1_DIMMB 3. Memory modules of the same type and density are required for dual -channel DDR operation. Mismatched memory may cause system instability.

Refer to the following table for supported DDR populations .
(Note: X indicates a populated DIMM s lot)

Population Option	Single CPU Installed (CPU1 only)				Dual CPU installed (CPU1 and CPU2)			
	1	2	3	4	5	6	7	8
CPU1_DIMMA0				x				x
CPU1_DIMMB0				x				x
CPU1_DIMMA1			x	x			x	x
CPU1_DIMMB1			x	x			x	x
CPU1_DIMMA2		x	x	x		x	x	x
CPU1_DIMMB2		x	x	x		x	x	x
CPU1_DIMMA3	x	x	x	x	x	x	x	x
CPU1_DIMMB3	x	x	x	x	x	x	x	x
CPU2_DIMMA0								x
CPU2_DIMMB0								x
CPU2_DIMMA1							x	x
CPU2_DIMMB1							x	x
CPU2_DIMMA2						x	x	x
CPU2_DIMMB2						x	x	x
CPU2_DIMMA3					x	x	x	x
CPU2_DIMMB3					x	x	x	x

When the DIMMs are not fully populated, the system can support 1 28MB,
256MB, 512MB, 1GB and 2GB of PC2100/2700 Registered memory
modules.

However, if **8 DIMMs and 16 DIMMs are populated for single and dual
CPU operation respectively, the system can only support up to PC2100.**
All installed memory will be automatically detected.
The T hunder K8HM S3892 supports up to 32GB of memory.

Memory Installation Procedure

When you install the memory modules, make sure the module aligns properly with the memory slot. The modules are keyed to ensure that it is inserted only one way. The method of installing memory modules are detailed by the following diagrams.

DDR SDRAM Module

DDR SDRAM DIMM Slot - 184 Pins (1 key)
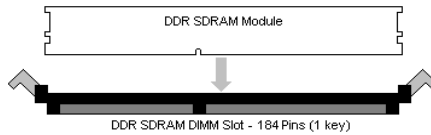
Once the memory modules are firmly seated in the slot, two latches on either side will close and secure the module into the slot. Sometimes you may need to close the latches yourself.

DDR SDRAM Module

DDR SDRAM DIMM Slot - 184 Pins (1 key)
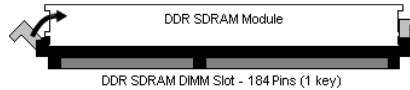
To remove the memory module, simply push the latches outwards until the memory module pops up. Then remove the module.

NOTE

YOU MUST ALWAYS unplug the power connector from the motherboard before performing system hardware changes. Otherwise you may damage the board and/or expansion device.

2.10 - Attaching Drive Cables

Attaching IDE Drive Cable
Attaching the IDE drive cable is simple. The cable is "keyed" to only allow it to be connected in the correct manner.

Attaching IDE cable to the IDE connector is illustrated below:
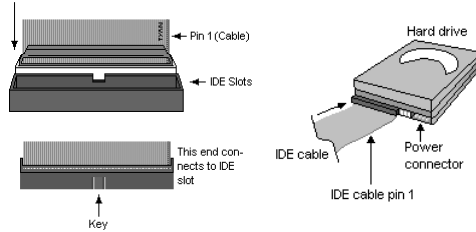
Simply plug in the BLUE END of the IDE cable into the motherboard IDE connector, and the other end into the drive. Each standard IDE cable has three connectors, two of which are closer together. The BLUE connector that is furthest away from the other two is the end that connects to the motherboard. The other two connectors are used to connect to drives.

Note: Always remember to properly set the drive jumpers. If only using one device on a channel, it must be set as Master for the BIOS to detect it.

TIP: Pin 1 on the IDE cable (usually designated by a colored wire) faces the drive's power connector.

Attaching Serial ATA Cables
The Thunder K8HM is also equipped with 4 Serial ATA (SATA) channels. Connections for these drives are also very simple.

There is no need to set Master/Slave jumpers on SATA drives.

The following pictures illustrate how to connect an SATA drive

1. SATA drive cable connection

2. SATA drive power connection

3. SATA cable motherboard connector

4. SATA drive power adapter
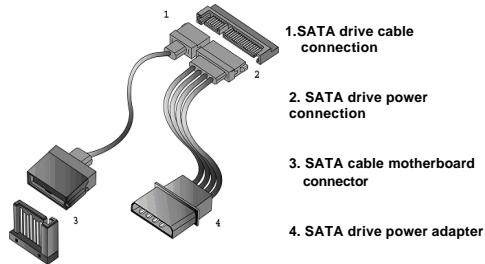
Attaching Floppy Drive Cables
Attaching floppy diskette drives are done in a similar manner to hard drives. See the picture below for an example of a floppy cable. Most of the current floppy drives on the market require that the cable be installed with the colored stripe positioned next to the power connector. In most cases, there will be a key pin on the cable which will force a proper connection of the cable.

Twist at the end of the ribbon cable
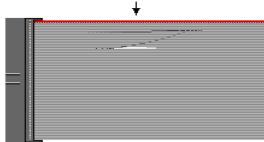
Attach first floppy drive (drive **A:**) to the end of the cable with the twist in it. Drive **B:** is usually connected to the next possible connector on the cable (the second or third connector after you install Drive **A:**).

2.11 - Installing Add-In Cards

Before installing add-in cards, it's helpful to know if they are fully compatible with your motherboard. For this reason, we've provided the diagrams below, showing the most common slots that may appear on your motherboard. Not all of the slots shown will necessarily appear on your motherboard.

Two 64-bit 133/100MHz PCI-X (white) slots

One 64-bit 133/100MHz PCI-X (green) slot

One 32-bit 33MHz PCI v2.3 slot

Two PCI-Express x16 slots (each w/ x8 signal)

NOTE **YOU MUST ALWAYS** unplug the power connector from the motherboard before performing system hardware changes. Otherwise you may damage the board and/or expansion device.

Simply find the appropriate slot for your add-in card and insert the card firmly. Do not force any add-in cards into any slots if they do not seat in place. It is better to try another slot or return the faulty card rather than damaging both the motherboard and the add-in card.

2.12 - Installing Optional SO-DIMM Modules

Your Thunder K8HM S3892 motherboard is equipped with an optional propri etary SO-DIMM connector. The SO-DIMM connector can be used for expansion cards to provide such features as, additional SAS/SATA II or SCSI support. For details of available expansions cards, visit the TYAN website at http://www.tyan.com. To install a SO-DIMM expansion card:

1. Open the spring levers as shown.

2. Insert the SO-DIMM card as shown, making sure that the card is the right way up. The card will fit in only one way and the screw holes in the card should line up exactly with the mounting posts on the motherboard.

3. Push the SO-DIMM card down into place and make sure the spring levers click into place as shown.

4. Screw the board into place using one or two screws as required.
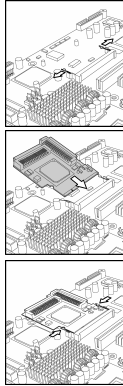
Removal of a SO-DIMM card is a reversal of the install ation procedure. Push out the spring levers as shown and pull the card out of the socket.
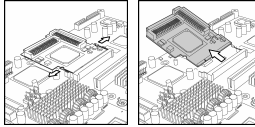
The SO-DIMM expansion cards will fit in the slot only one way. Make sure that you align the slot in the card with the key in the c ard slot.

——Key slot
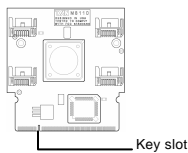
2.13 - Connecting External Devices

Your motherboard supports a number of different interfaces for connec ting peripherals. Some I/O ports may not be available with the board due to the different configurations.

PS/2 Mouse/Keyboard

Serial Port

Integrated Video

LAN2 Port   LAN1 Port

LAN3 Port
USB x 2
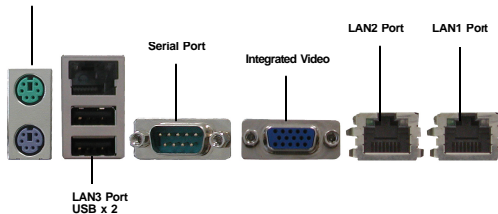
Peripheral devices can be plugged straight into any of these ports but sof tware may be required to complete the installation.

LAN1 and LAN2 LED Color Definition
The two onboard LAN ports have green LEDs to indicate the LAN status. The chart below illustrates the different LED states.

	LAN1 and LAN2 Link/Activiey LED Scheme	
Left Right	**Left LED**	**Right LED**
	Activity	Link
	Green (Blink)	Green

LAN3 LED Color Definition
The onboard Ethernet port has green and yellow LEDs to indicate LAN status.
The chart below illustrates the different LED states.

	10/100 Mbps LAN3 Link/Activity LED Scheme	
Speed	Left LED	Right LED
Link 10Mbps	Green	Off
Activity 10Mbps	Green (Blink)	Off
Link 100Mbps	Green	Green
Activity 100Mbps	Green (Blink)	Green

Left Right

2.14- Installing the Power Supply

There are two power connectors on your Thunder K8HM.
The Thunder K8HM requires an EPS12V (24 pin + 8 pin) power supply to boot.

Please be aware that ATX 2.x and ATXGES power supplies are **not compatible** with the board and can damage the motherboard and/or CPU(s).

EPS12V Main Power 24-Pin
 (Chipsets & Components)

1   12

13   24

12	+3.3V	24	GND
11	+12V2	23	+5V
10	+12V2	22	+5V
9	+5VSB	21	+5V
8	PWR OK	20	RESVD
7	GND	19	GND
6	+5V	18	GND
5	GND	17	GND
4	+5V	16	PSON#
3	GND	15	GND
2	+3.3V	14	-12V
1	+3.3V	13	+3.3V

1   4

5   8

EPS 12V 8-pin (CPU Power)

4	GND	8	+12V3
3	GND	7	+12V3
2	GND	6	+12V3
1	GND	5	+12V3

Applying power to the board

1. Connect the EPS 12V 8-pin power connector.
2. Connect the EPS 12V 24-pin power connector.
3. Connect power cable to power supply and power outlet

NOTE	**YOU MUST**unplug the power supply from the wall outlet before plugging the power cables to motherboard connectors.

2.14 – Finishing Up

Congratulations! You're finished setting up the hardware as pect of your computer. Before closing up your chassis, make sure that all cables and wires are connected properly, especially IDE cables and jumpers. You may have difficulty powering on your system if the motherboard jumpers are not set correctly.

In the rare circumstance that you have experienced difficulty, you can find help by asking your vendor for assistance. If they are not available for assistance, please find setup information and documentation online at our website or by **calling your vendor's support line.**

Chapter 3: BIOS

3.1 – BIOS Setup Utility

With the BIOS setup utility, you can modify BIOS settings and control the special features of your computer. The setup utility uses a number of menus for making changes and turning the special features on or off.

NOTE	All menus are based on a typical system. The actual menus displayed on your screen may be different and depend on the hardware and features installed in your computer.

To start the BIOS setup utility:
- a. Turn on or reboot your system
- b. Press <Del> during POST (F4 on remote console) to start BIOS setup utility

```
                           BIOS Setup Utility
       Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

   System Overview                              Use [ENTER], [TAB]
                                                or [SHIFT-TAB] to
   AMIBIOS                                      select a field
   Version      : 08.00.xx
   Build Date : 08/31/05                        Use [+] or [-] to
   ID           : 0AAAA000                      configure system time.

   Processor
   Type       : AMD Opteron(tm) Model xxx
   Speed      : xxxx MHz
   Count      : x                               ? ? Select Screen
                                                ? ? Select Item
   System Memory                                +/-    Change Option
   Size       : xxxx MB                         F1     General Help
                                                F10  Save and Exit
   System Time            [22:21:21]            ESC  Exit
   System Date            [ Tue 01/01/2002]
```

To select an item
Use the left/right (← →) arrow keys to make a selection.

To display a sub-menu (A pointer " ▶ " marks all sub menus)

Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>.

3.2 – BIOS Menu Bar

The menu bar at the top of the windows lists these selections:

Main	To configure basic system setups
Advanced	To configure the advanced chipset features
PCI/PnP	To configure legacy Plug & Play or PCI settings
Boot	To configure system boot order
Security	To configure user and supervisor passwords
Chipset	To configure chipset management features
Exit	To exit setup utility

NOTE   Options written in **bold type** represent the BIOS setup default

3.3 – BIOS Legend Bar

The chart describes the legend keys and their alternates:

Key	Function
<F1>	General help window
<ESC>	Exit current menu
← → arrow keys	Select a different menu
↑ or ↓ arrow keys	Move cursor up/down
<Tab> or <Shift-Tab>	Cycle cursor up/down
<Home> or <End>	Move cursor to top/bottom of the window
<PgUp> or <PgDn>	Move cursor to next/previous page
<->	Select the previous value/setting of the field
<+>	Select the next value/setting of the field
<F8>	Load Fail Safe default configuration values of the menu
<F9>	Load the Optimal default configuration values of the menu
<F10>	Save and exit
<Enter>	Execute command or select submenu

3.4 – BIOS Main Menu

The Main BIOS Menu is the first screen that you can navigate. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed -out" options cannot be configured, options in blue can be changed.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often, a text message will accompany it.

```
                          BIOS Setup Utility
      Main    Advanced    PCI/PnP    Boot   Security   Chipset    Exit

 System Overview                                Use [ENTER], [TAB] or
                                                [SHIFT-TAB] to select a
                                                field
 AMIBIOS
 Version     : 08.00.xx                         Use [+] or [-] to
 Build Date : 08/31/05                          configure system time.
 ID          : 0AAAA000

 Processor
 Type        : AMD Opteron(tm) Model xxxx
 Speed       : xxxx MHz
 Count       : x                                ? ?  Select Screen
                                                ? ?  Select Item
 System Memory                                  Enter Go to Sub Screen
 Size        : xxxx MB                          F1    General Help
                                                F10   Save and Exit
 System Time          [22:21: 21]               ESC  Exit
 System Date          [ Tue 01/ 01/2002]
```

Feature	Option	Description
Main		
System Time	HH : MM : SS	Set the system time
System Date	MM : DD : YYYY	Set the system date

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3.5 – BIOS Advanced Menu

You can select any of the items in the left frame of the screen, such as Super I/O Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages.

```
                         BIOS Setup Utility
     Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit
  Advanced Settings
                                                    Options for CPU
  WARING: Setting wrong values in below sections may
          cause system to malfunction.
                                                    ?  ?  Select Screen
  ▶ CPU Configuration                               ?  ?  Select Item
  ▶ IDE Configuration                               Enter  Go to Sub Screen
  ▶ Floppy Configuration                            F1    General Help
  ▶ Super IO Configuration                          F10   Save and Exit
  ▶ S-ATA Configuration                             ESC   Exit
  ▶ ACPI Configuration
  ▶ Event Log Configuration
  ▶ Hyper Transport Configuration
  ▶ Hardware Health Configuration
  ▶ MPS Configuration
  ▶ PCI Express Configuration
  ▶ AMD PowerNow Configuration
  ▶ Remote Access Configuration
  ▶ USB Configuration
  ▶ Device & PCI Slots Configuration
```

Feature	Option	Description
Advanced Settings		
CPU Configuration	**Menu Item**	Options for CPU
IDE Configuration	**Menu Item**	Configure the IDE device(s)
Floppy Configuration	**Menu Item**	Configure the Floppy drive(s)
Super IO Configuration	**Menu Item**	Configures Super IO Chipset Nat417
S-ATA Configuration	**Menu Item**	Configure ServerWorks HT1000 S-ATA
ACPI Configuration	**Menu Item**	Section for Advanced ACPI Configuration
Event Log Configuration	**Menu Item**	Mark as read, Clear or View Event Log statistics
Hyper Transport Configuration	**Menu Item**	Configure HT links
Hardware Health Configuration	**Menu Item**	Configure/monitor the Hardware Health

Feature	Option	Description
Advanced Settings		
MPS Configuration	**Menu Item**	Configure the Multi-Processor Table
PCI Express Configuration	**Menu Item**	Configure PCI Express L0 and L1 link power states
AMD PowerNow Configuration	**Menu Item**	Configure AMD PowerNow support
Remote Access Configuration	**Menu Item**	Configure Remote Access
USB Configuration	**Menu Item**	Configure the USB support
Device & PCI Slots Configuration	**Menu Item**	Onboard Devices and PCI Add-On Cards Enabled/Disabled

3.5.1 CPU Configuration Sub-Menu

You can use this screen to view CPU Configuration Menu. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                          BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  CPU Configuration                                   This option should
                                                      remain disabled for
                                                      normal operation.
  Module Version  :  XX.XX                            The driver developer
  Physical Count  :  X                                may disable it for
  Logical Count   :  X                                testing purpose.


  Dual Core AMD Opteron (tm) Processor  XXX
  Revision :  XX
  Cache L1:  XXXKB
  Cache L2:  XXXXKB
  Speed:     XXXXMHz
  Current FSB Multiplier   :   XXX                    ? ?  Select Screen
  Maximum FSB Multiplier  :   XXX                     ? ?  Select Item
  Able to change Freq.      :   Yes                   +/-   Change Option
  uCode Patch Level         :   XXXX                  F1    General Help
                                                      F10   Save and Exit
  GART Error Reporting        [Disabled]              ESC  Exit
  MTRR Mapping                [Continuous]
```

Feature	Option	Description
CPU Configuration		
Module Version Physical Count Logical Count	Read only	Displays information about CPU
Revision Cache L1 Cache L2 Speed Current FSB Multiplier Maximum FSB Multiplier Able to change Freq. uCode Patch Level	Read only	Displays information about CPU

Feature	Option	Description
CPU Configuration		
GART Error Reporting	**Disabled**	This option should remain disabled for normal operation. The driver developer may enable it for the purpose of testing.
	Enabled	
MTRR Mapping	**Continuous**	This option determines the method used for programming CPU MTRRs when 4GB or more of memory is preset. Discrete leaves the PCI hole below the 4GB boundary undescribed. Continuous explicitly describes the PCI hole as non-cacheable.
	Discrete	

3.5.2– IDE Configuration Sub-Menu

You can use this screen to select options for the IDE Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected op tion.

```
                          BIOS Setup Utility
        Main    Advanced   PCI/PnP    Boot    Security    Chipset    Exit

  IDE Configuration                                     While entering setup,
                                                        BIOS auto detects the
                                                        presence of IDE devices.
  ▸ Primary IDE Master            [xxxx]                This displays the status of
  ▸ Primary IDE Slave             [xxxx]                auto detection of IDE
                                                        devices.
  IDE Detect Time Out (Sec) :     [xx]
                                                        ?  ?  Select Screen
                                                        ?  ?  Select Item
                                                        +/-    Change Option
                                                        F1    General Help
                                                        F10   Save and Exit
                                                        ESC  Exit
```

Feature	Option	Description
IDE Configuration		
Primary IDE Master/Slave	**Auto** XXXX Not Det ected Enabled	While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE devices.
IDE Detect Time Out (Sec)	**0–35** (at 5 interval)	Selects the time out value for detecting ATA/ATAPI device(s).

3.5.2.1 – Primary/Secondary IDE Master/Slave Sub-Menu

```
                          BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit
      ┌────────────────────────────────────┬──────────────────────────────┐
        Primary IDE Master                  │  ?  ?   Select Screen
                                            │  ?  ?   Select Item
        Device: Not Detected                │  +/-    Change Option
                                            │  Tab    Select Field
        Type                       [Auto]   │  F1     General Help
        LBA /Large Mode            [Auto]   │  F10    Save and Exit
        Block (Multi-Sector Transf er) [Auto] │ ESC   Exit
        PIO Mode                   [Auto]   │
        DMA Mode                   [Auto]   │
        S.M.A.R.T.                 [Auto]   │
        32 Bit Data Transfer       [Enabled]│
      └────────────────────────────────────┴──────────────────────────────┘
```

Feature	Option	Description
Configure Nat417 Super IO Chipset		
Type	**Auto** / Not Installed / CD/DVD / ARMD	Selects the type of device connected to the system.
LBA/Large Mode	**Auto** / Disabled	Auto: Enabled LBA Mode if the device supports it and the device is not already formatted with LBA Mode disabled. Disabled: Disabled LBA Mode.
Block (Multi-Sector Transfer)	**Auto** / Disabled	Disabled: The Data transfer from and to the device occurs one sector at a time. Auto: The Data transfer from and to the device occurs multiple sectors at a time if the device supports it.
PIO Mode	**Auto** / 0~4 (at 1 interval)	Selects the PIO Mode. Select Auto to enhance hard disk performance by optimizing the hard disk timing.
DMA Mode	**Auto**	Selects DMA Mode. Auto: Auto detected.
S.M.A.R.T.	**Auto** / Disabled / Enabled	S.M.A.R.T (Self -Monitoring Analysis and Reporting Technology) is a utility that monitors your disk status to predict hard disk failure.
32Bit Data Transfer	**Enabled** / Disabled	Enables 32-bit to maximize the IDE hard disk data transfer rate.

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3.5.3 – Floppy Configuration Sub-Menu

You can use this screen to specify options for the Floppy Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The settings are described on the following pages.

```
                        BIOS Setup Utility
      Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  Floppy Configuration                              Select the type of
                                                    floppy drive connected
                                                    to the system.

  Floppy A              [1.44 MB  31/2]
  Floppy B              [Disabled]

                                                    ?  ?  Select Screen
                                                    ?  ?  Select Item
                                                    +/-  Change Option
                                                    F1     General Help
                                                    F10   Save and Exit
                                                    ESC  Exit
```

Feature	Option	Description
Floppy Configuration		
Floppy A Floppy B	Disabled 360 KB 51/4" 1.2 MB 51/4' 720 KB 31/2" **1.44 MB 31/2'** 2.88 MB 31/2"	Selects the type of floppy drive connected to the system.

3.5.4 – Super IO Configuration Sub-Menu

You can use this screen to select options for the Super I/O settings. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option

BIOS Setup Utility		
Main **Advanced** PCI/PnP Boot Security	Chipset Exit	
Configure Nat417 Super IO Chipset	Allows BIOS to enable or disable Floppy Controller.	
Onboard Floppy Controller [Enabled] Serial Port1 Address [3F8/IRQ4] Serial Port2 Address [2F8/IRQ3]	? ? Select Screen ? ? Select Item +/- Change Option F1 General Help F10 Save and Exit ESC Exit	

Feature	Option	Description
Configure Nat417 Super IO Chipset		
Onboard Floppy Controller	Enabled Disabled	Allows BIOS to enable or disable the floppy controller.
Serial Port1 Address	3F8/IRQ4 3E8/IRQ4 2E8/IRQ3 Disabled	Allows BIOS to select Serial Port1 Base Addresses.
Serial Port2 Address	2F8/IRQ3 3E8/IRQ4 2E8/IRQ3 Disabled	Allows BIOS to select Serial Part2 Base Addresses.

3.5.5 S-ATA Configuration Sub-Menu

You can use this screen to view S-ATA Configuration Menu. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                        BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  Configure ServerWorks                              Enable HT1000
                                                     S-ATA.

  HT1000 S-ATA                    [Enabled]          ? ?  Select Screen
  S-ATA Mode                      [P-ATA]            ? ?  Select Item
  INT13 Support                   [Enabled]          +/-   Change Option
                                                     F1    General Help
                                                     F10   Save and Exit
                                                     ESC  Exit
```

Feature	Option	Description
Configure ServerWorks		
HT1000 S-ATA	**Enabled**	Allows user to enable or disable HT1000 S-ATA controller.
	Disabled	
S-ATA Mode	**P-ATA**	Sets S-ATA mode as P-ATA emulation or native S-ATA.
	S-ATA	
INT13 Support	**Enabled**	Enables or disables INT13 support.
	Disabled	

3.5.6 –ACPI Configuration Sub-Menu

Use this screen to select options for ACPI. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on this page. The screen is shown below.

```
                        BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  Advanced ACPI Configuration                          Enable RSDP pointers
                                                       to 64- bit Fixed System
                                                       Description Tables.  Di
  ACPI Version Features           [ACPI v2.0]          ACPI version has some
  ACPI APIC Support               [Enabled]
  ACPI SRAT Table                 [Enabled]
  AMI OEMB table                  [Enabled]
  Headless mode                   [Disabled]           ?  ?  Select Screen
                                                       ?  ?  Select Item
                                                       +/-    Change Option
                                                       F1     General Help
                                                       F10    Save and Exit
                                                       ESC  Exit
```

Feature	Option	Description
Advanced ACPI Configuration		
ACPI Version Features	ACPI v3.0	Set this value to allow or prevent the system to be complaint with the ACPI 2.0 specification.
	ACPI v2.0	
	ACPI v1.0	
ACPI APIC Support	**Enabled**	This option allows you to define whether or not to enable ACPI management features.
	Disabled	
ACPI SRAT Table	**Enabled**	Enable or disable the building of ACPI SRAT Table.
	Disabled	
AMI OEMB table	**Enabled**	Set this value to allow the ACPI BIOS to add a pointer to an OEMB table in the Root System Description Table (RSDT) table.
	Disabled	Note: OEMB table is used to pass POST data to the AMI code during ACPI O/S operations.
Headless mode	Enabled	Enable or disable Headless operation mode through ACPI.
	Disabled	

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3.5.7 – Event Logging details Sub-Menu

You can use this screen to view the Event Log Control Menu. This logs system events (such as CMOS clear, ECC memory errors, etc) and writes the log into NVRAM. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                          BIOS Setup Utility
        Main    Advanced   PCI/PnP   Boot   Security   Chipset   Exit

        Event Logging details                          View all unread events
                                                       on the Event Log.

        View Event Log
        Mark All Event s as Read                       ? ?  Select Screen
        Clear Event Log                                ? ?  Select Item
        Event Log Statistics                           +/-    Change Option
                                                       Enter Go to Sub Screen
                                                       F1     General Help
                                                       F10   Save and Exit
                                                       ESC  Exit
```

Feature	Option	Description
Event Logging details		
View Event Log		Views all unread events on the Event Log
Mark All Event s as Read	OK Cancel	Marks all unread events as read.
Clear Event Log	OK Cancel	Erases all of events.
Event Log Statistics		View details on the count of total unread events. Other stats include size occupied and size free. (in terms of event units)

3.5.8 – Hyper Transport Configuration Sub-Menu

You can use this screen to view the Hyper Transport Configuration Menu. Use the Plus and Minus (+/-) keys to change the va lue of the selected option. The settings are described on the following pages.

```
                           BIOS Setup Utility
       Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  Hyper Transport Configuration                          The Hyper Transport
                                                         link will run at this
                                                         speed if it is slower
  CPU1: CPU2 HT Link Speed          [N/A]                than or equal to the
  CPU1: CPU2 HT Link Width          [N/A]                system clock and the
                                                         board is capable.
  CPU0: HT2000 HT Link Speed        [Auto]
  CPU0: HT2000 HT Link Width        [Auto]
                                                         ?  ?  Select Screen
  HT2000: HT1000 HT Link Speed      [Auto]               ? ?  Select Item
  HT2000: HT1000 HT Link Width      [Auto]               +/-    Change Option
                                                         F1     General Help
                                                         F10    Save and Exit
                                                         ESC  Exit
```

Feature	Option	Description
Hyper Transport Configuration		
CPU1: CPU2 HT Link Speed	**Auto** / 200MHz / 400MHz / 600MHz / 800MHz / 1GHz	Specifies CPU1 to CPU2 Hyper Transport Link Clock frequency. If CPU2 is absent, the selection item will be hidden.
CPU1: CPU2 HT Link Width	**Auto** / 2 Bit / 4 Bit / 8 Bit / 16 Bit	Specifies CPU1 to CPU2 Hyper Transport Link Data width. If CPU2 is absent, the selection item will be hidden.
CPU0: HT2000 HT Link Speed / HT2000: HT1000 HT Link Speed	**Auto** / 200MHz / 400MHz / 600MHz / 800MHz	The Hyper Transport link will run at this speed if it is slower than or equal to the system clock and the board is capable.
CPU0: HT2000 HT Link Width / HT2000: HT1000 HT Link Width	**Auto** / 2 Bit / 4 Bit / 8 Bit	The Hyper Transport link will run at this width.

3.5.9 – Hardware Health Configuration Sub-Menu

You can use this screen to view the Hardware Health Configuration Settings. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                           BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

    Hardware Health Configuration                        Enables Hardware
                                                         Health Monitoring
                                                         Device.
    H/W Health Function              [Enabled]
    FAN Select                       [4Pin FAN]
    CPU FAN1, FAN1, 2 Power Control  [Disabled]
    CPU FAN2, FAN3, 4 Power Control  [Disabled]
    FAN Fail LED Indicator           [Disabled]

    Hardware Health Event Monitoring                     ?  ?  Select Screen
                                                         ?  ?  Select Item
                                                         +/-    Change Option
    ▸ Mainboard Voltages Report                          Tab   Select Field
                                                         F1     General Help
    CPU1 Temperature                 :xx C/ xxx F        F10   Save and Exit
    CPU2 Temperature                 :xx C/ xxx F        ESC  Exit
    AMB1 Temperature                 :xx C/ xxx F
    AMB2 Temperature                 :xx C/ xxx F

    CPU FAN1 Speed                   :xxxx RPM
    CPU FAN2 Speed                   :xxxx RPM
    FAN1 Speed                       :xxxx RPM
    FAN2 Speed                       :xxxx RPM
    FAN3 Speed                       :xxxx RPM
    FAN4 Speed                       :xxxx RPM
    FAN5 Speed                       :xx C/ xxx F
    FAN6 Speed                       :xx C/ xxx F
```

Feature	Option	Description
Hardware Health Configuration		
H/W Health Function	**Enabled**	Enables Hardware Health Monitoring Device.
	Disabled	
FAN Select	**4Pin FAN**	Selects the FAN type.
	3Pin FAN	

Feature	Option	Description
Hardware Health Configuration		
CPU FAN1, FAN1, 2 Power Control	Enabled / **Disabled**	FAN power duty cycle is auto dynamic programmed in selected temperature range. Disabled: Fan Power On. Enabled: Fan Power Duty Cycle= 30%(40℃)- 100%(60℃), see CPU temperature
CPU FAN2, FAN3, 4 Power Control	Enabled / **Disabled**	FAN power duty cycle is auto dynamic programmed in selected temperature range. Disabled: Fan Power On. Enabled: Fan Power Duty Cycle= 30%(30℃)- 100%(43℃), see mainboard temp.
FAN Fail LED Indicator	Enabled / **Disabled**	Enabled: Any FAN speed less than 800 RPM, the FAN Fail LED will be lighted.

Feature	Option	Description
Hardware Health Event Monitoring		
Mainboard Voltages Report	read only	Displays Volt age for CPU, memory, & other devices
CPU1 Temperature	read only	Displays CPU Temperature and FAN Speed.
CPU2 Temperature		
AMB1 Temperature		
AMB2 Temperature		
CPU FAN 1 Speed		
CPU FAN2 Speed		
FAN1/2/3/4/5/6 Speed		

3.5.9.1 – Mainboard Voltages Report Sub-Menu

BIOS Setup Utility						
Main	**Advanced**	PCI/PnP	Boot	Security	Chipset	Exit

Board Voltages Report		
		? ? Select Screen
		? ? Select Item
CPU1 Vdimm	: x.xxx V	+/- Change Option
CPU2 Vdimm	: x.xxx V	Tab Select Field
CPU1 Vcore	: x.xxx V	F1 General Help
CPU2 Vcore	: x.xxx V	F10 Save and Exit
+V3.3 (SB)	: x.xxx V	ESC Exit
+3VDU	: x.xxx V	
+V5 (SB)	: x.xxx V	
VCC	: x.xxx V	
+12V (for cpu1 vcore)	: x.xxx V	
+12V (for cpu2 vcore)	: x.xxx V	

3.5.10 MPS Configuration Sub-Menu

You can use this screen to select MPS revision. Use the up and down arrow (↑/↓) keys to select an item. The settings are described on the following pages.

```
                          BIOS Setup Utility
      Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

   MPS Configuration                                   Select MPS Revision.


   MPS Revision              [1.4]           ?  ?  Select Screen
                                             ?  ?  Select Item
                                             +/-    Change Option
                                             F1     General Help
                                             F10   Save and Exit
                                             ESC  Exit
```

Feature	Option	Description
MPS Configuration		
MPS Revision	1.1 **1.4**	Allows user to select MPS revision.

3.5.11 PCI Express Configuration Sub-Menu

You can use this screen to enable PCI Express support. Use the up and down arrow (↑/↓) keys to select an item. The settings are described on the following pages.

```
                              BIOS Setup Utility
      Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

    PCI Express Configuration                         Enabled/Disabled PCI
                                                      Express L0s and L1
                                                      link power states.
    Active State Power -Management          [Disabled]

                                                      ?  ?  Select Screen
                                                      ?  ?  Select Item
                                                      +/-    Change Option
                                                      F1     General Help
                                                      F10   Save and Exit
                                                      ESC  Exit
```

Feature	Option	Description
PCI Express Configuration		
Active State Power - Management	Enabled **Disabled**	Enabled/Disabled PCI Express L0s and L1 link power states.

3.5.12 AMD PowerNow Configuration Sub-Menu

You can use this screen to enable AMD PowerNOw support. Use the up and down arrow (↑/↓) keys to select an item. The settings are described on the following pages.

BIOS Setup Utility						
Main	**Advanced**	PCI/PnP	Boot	Security	Chipset	Exit

AMD PowerNow Configuration		Enabled/Disabled PowerNow.
PowerNow	[Disabled]	
		? ? Select Screen
		? ? Select Item
		+/- Change Option
		F1 General Help
		F10 Save and Exit
		ESC Exit

Feature	Option	Description
AMD PowerNow Configuration		
PowerNow	Enabled	Enabled/Disabled Po werNow
	Disabled	

3.5.13 – Remote Access Configuration Sub-Menu

You can use this screen to view the Remote Access Configuration Menu. This feature allows access to the Server remotely via serial port. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                           BIOS Setup Utility
      Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit
                                                    Select remote access
    Configure Remote Access type and parameters     type.

                                                    ? ?  Select Screen
    Remote Access                   [Disabled]      ? ?  Select Item
                                                    +/-     Change Field
                                                    F1     General Help
                                                    F10   Save and Exit
                                                    ESC  Exit
```

Feature	Option	Description
Configure Remote Access type and parameters		
Remote Access	Enabled **Disabled**	Enables remote access to system through serial port.

3.5.14 – USB Configuration Sub-Menu

You can use this screen to view the USB Configuration Menu. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                        BIOS Setup Utility
        Main   Advanced   PCI/PnP   Boot   Security   Chipset   Exit

  USB Configuration                              Enables USB host
                                                 controllers.
  Module Version – X.XX.X-XX.X
                                                 ?  ?  Select Screen
  USB Devices Enabled:                           ?  ?  Select Item
           None                                  +/-    Change Option
                                                 F1     General Help
  Legacy USB Support          [Enabled]          F10    Save and Exit
  BIOS EHCI Hand-Off          [Enabled]          ESC  Exit
```

Feature	Option	Description
USB Configuration		
Legacy USB Support	Disabled	Enables support for legacy USB.
	Enabled	
BIOS EHCI Hand-Off	**Enabled**	This is a work around for OSes without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver
	Disabled	

3.5.15 Device & PCI Slots Configuration Sub-Menu

You can use this screen to enable the onboard devices and PCI slots. Use the up and down arrow (↑/↓) keys to select an item. The settings are described on the following pages.

BIOS Setup Utility						
Main	**Advanced**	PCI/PnP	Boot	Security	Chipset	Exit

Onboard Device and PCI Slots Configuration		Enabled Disabled
Onboard VGA	[Enabled]	? ? Select Screen
Onboard LAN1, LAN2 Devices	[Enabled]	? ? Select Item
Onboard LAN1 OP-ROM	[Disabled]	+/- Change Option
Onboard LAN2 OP-ROM	[Disabled]	F1 General Help
Onboard LAN3 Device	[Enabled]	F10 Save and Exit
Onboard LAN3 OP-ROM	[Disabled]	ESC Exit

Feature	Option	Description
MPS Configuration		
Onboard VGA	Disabled **Enabled**	Enabled/Disabled VGA controller
Onboard LAN1, LAN2 Devices Onboard LAN3 Device	Disabled **Enabled**	Enabled/Di sabled LAN controller
Onboard LAN1 OP-ROM Onboard LAN2 OP-ROM Onboard LAN2 OP-ROM	**Disabled** Enabled	Executed LAN OPROM or not

3.6 –BIOS PCI/PnP Menu

You can use this screen to view PnP (Plug & Play) BIOS Configuration Menu. This menu allows the user to configure how the BIOS assigns resources & resolves conflicts. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option. The settings are described on the following pages.

```
                           BIOS Setup Utility
         Main     Advanced    PCI/PnP    Boot    Security    Chipset    Exit

     Advanced PCI/PnP Settings                          Clear NVRAM during
                                                        System Boot.

     WARING: Setting wrong values in below sections may
     cause system to malfunction.                       ? ?  Select Screen
                                                        ? ?  Select Item
     Clear NVRAM                      [No]              +/-    Change Option
     Plug & Play O/S                  [Yes]             F1     General Help
     PCI Latency Timer                [64]              F10    Save and Exit
     PCI Bus Scan Order               [Descent]         ESC  Exit
     Allocate IRQ to PCI VGA          [Yes]
     Palette Snooping                 [Disabled]
     PCI IDE BusMaster                [Disabled]
```

Feature	Option	Description
Advanced PCI/PnP Settings		
Clear NVRAM	**No** Yes	Clears NVRAM during system Boot.
Plug & Play OS	**Yes**	No: lets the BIOS configure all the devices in the system. Yes: lets the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.
	No	
PCI Latency Timer	32	This setting controls how many PCI clocks each PCI device can hold the bus before another PCI device takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. Values in units of PCI clocks for PCI device latency timer register.
	64	
	96	
	128	
	160	
	192	
	224	
	248	
PCI Bus Scen Order	Ascent	Ascent: Scan PCI bus from bus 0 to maximum. Descent: Scan PCI bus from maximum to bus 0.
	Descent	
Allocate IRQ to PCI VGA	**Yes**	Yes: assigns IRQ to PCI VGA card if card requests IRQ.
	No	
Palette Snooping	**Disabled**	This is the default setting and should not be changed unless the VGA card manufacturer requires Palette Snooping to be Enabled.
	Enabled	Enabled: informs the PCI devices that an ISA graphics device is installed in the system so the card will function correctly.
PCI IDE BusMast er	**Disabled** Enabled Reserved	Enabled: BIOS uses PCI bus mastering for reading / writing to IDE drives.

3.7 – BIOS Boot Menu

You can display Boot Setup option by highlighting it using the Arrow (↑/↓) keys and pressing Enter. The settings are described on the following pages.

```
                         BIOS Setup Utility
       Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

 Boot Settings                                    Configures settings
                                                  during System Boot.

 ‣ Boot Settings Configuration                    ?  ?  Select Screen
                                                  ?  ?  Select Item
 ‣ Boot Device Priority                           Enter Go to Sub Screen
 ‣ Removable Drives                               F1    General Help
 ‣ CD/DVD Drives                                  F10   Save and Exit
                                                  ESC   Exit
```

3.7.1 – Boot Settings Configuration Sub-Menu

Use this screen to select options for the Boot Settings Configuration. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

```
                         BIOS Setup Utility
       Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

 Boot Settings Configuration                      Allows BIOS to skip
                                                  certain tests while
 Quick Boot                  [Disabled]           booting.  This will
 Quiet Boot                  [Disabled]           decrease the time
 Add On ROM Display Mode     [Force BIOS]         needed to boot the
 Boot up Num-Lock            [On]                 system.
 PS/2 Mouse Support          [Auto]
 Wait for 'F1' if Error      [Enabled]            ?  ?  Select Screen
 Hit 'DEL' Message Display   [Enabled]            ?  ?  Select Item
 Interrupt 19 Capture        [Disabled]           +/-    Change Option
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit
```

Feature	Option	Description
Boot Settings Configuration		
Quick Boot	Enabled	This option allows user bypass BIOS self test during POST.
	Disabled	
Quiet Boot	**Disabled**	Disabled: displays normal POST messages.
	Enabled	Enabled: displays OEM log instead of POST messages.
Add On ROM Display Mode	**Force BIOS**	Allows user to force BIOS/Option ROM of add-on cards to be displayed during quiet boot.
	Keep Current	
Boot up Num-Lock	On	Selects Power-on state for Numlock.
	Off	
PS/2 Mouse Support	Enabled	Selects support for PS/2 Mouse.
	Disabled	
	Auto	
Wait for 'F 1' If Error	**Enabled**	Waits for F1 key to be present if error occurs.
	Disabled	
Hit 'DE L' Message Display	**Enabled**	Displays "Press DEL to run Setup" in POST.
	Disabled	
Interrupt 19 Capture	**Disabled**	Enabled: allows option ROMs to trap interrupt 19.
	Enabled	

3.7.2 – Boot Device PrioritySub-Menu

Use this screen to select options for the Boot Device Priority. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) ke ys to change the value of the selected option.

```
                        BIOS Setup Utility
       Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

    Boot Device Priority                              Specifies the boot
                                                      sequence from the
                                                      available devices.
    1st Boot Device                [xx,xxx-xxxxx:xxx]
    2nd Boot Device                [xx,xxx-xxxxx:xxx]
                                                      A device enclosed in
                                                      parenthesis has
                                                      been disabled in the
                                                      corresponding type
                                                      menu.

                                                      ?  ?  Select Screen
                                                      ?  ?  Select Item
                                                      +/-    Change Option
                                                      F1     General Help
                                                      F10   Save and Exit
                                                      ESC  Exit
```

Feature	Option	Description
Boot Device Priority		
1st Boot Device	**xx,xxx-xxxxx:xxx**	Settings for boot priority.
2nd Boot Device	xx,xxx-xxxxx:xxx	These can be customized
	Disabled	depending on your preference.

3.7.3 – Removable Drives Sub-Menu

Use this screen to select options for the Removable Drives. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

```
                        BIOS Setup Utility
     Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  Removable Drives                                 Specifies the boot
                                                   sequence from the
  1st Drive              [xxxxxxxxxxxxxxxxx]        available devices.


                                                   ?  ?  Select Screen
                                                   ?  ?  Select Item
                                                   +/-    Change Option
                                                   F1     General Help
                                                   F10   Save and Exit
                                                   ESC  Exit
```

Feature	Option	Description
Removable Drives		
1st Drive	**xx,xxx-xxxxx:xxx** Disabled	Specifies the boot sequence for removable drive booting. This option will show all removable devices.

3.7.4 – Removable Drives Sub-Menu

Use this screen to select options for the CD/DVD Drives. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

```
                        BIOS Setup Utility
        Main    Advanced   PCI/PnP   Boot   Security    Chipset    Exit

    CD/DVD Drives                                    Specifies the boot
                                                     sequence from the
    1st Drive                [xxxxxxxxxxxxxxxxx]      available devices.



                                                     ?  ?  Select Screen
                                                     ?  ?  Select Item
                                                     +/-     Change Option
                                                     F1      General Help
                                                     F10  Save and Exit
                                                     ESC  Exit
```

Feature	Option	Description
CD/DVD Drives		
1st Drive	**xx,xxx-xxxxx:xxx**	Specifies the boot sequence for removable drive booting. This option will show all CD/DVD devices.
	Disabled	

3.8 – BIOS Security Menu

The system can be configured so that all users must enter a password every time the system boots or when BIOS Setup is entered, using either the Supervisor password or User password. The Supervisor an d User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must clear CMOS and reconfigure.

```
                         BIOS Setup Utility
    Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit
 ┌──────────────────────────────────────────┬──────────────────────────┐
 │ Security Setting s                        │ Install or change the    │
 │                                           │ password.                │
 │                                           │                          │
 │ Supervisor Password :   Not Installed     │                          │
 │ User Password       :   Not Installed     │ ? ?  Select Screen       │
 │                                           │ ? ?  Select Item         │
 │ Change Supervisor Password                │ +/-    Change Option     │
 │ Change User Password                      │ F1     General Help      │
 │                                           │ F10    Save and Exit     │
 │ Boot Sector Vir us Protection  [Disabled] │ ESC  Exit                │
 └──────────────────────────────────────────┴──────────────────────────┘
```

Feature	Option	Description
Security Setting s		
Supervisor Password:	**Not Installed**	If the password has been set, Installed displays. If no password is set, Not Installed displays.
	Installed	
User Password:	**Not Installed**	If the password has been set, Installed displays. If no password is set, Not Installed displays.
	Installed	
Change Supervisor Password		Selects this option to change or install Supervisor Password.
Change User Password		Selects this option to change or install User Password.
Boot Sector Virus Protection	**Disabled**	When it is set to [Enabled], BIOS will issue a virus warning message and beep if a write to the boot sector or the partition table of the HDD is attempted.
	Enabled	

3.9 – BIOS Chipset Menu

This menu allows the user to customize functions of the AMD Chipsets. North Bridge configuration contains options for Memory & CPU settings. South Bridge configuration contains options for SM Bus & USB. Additional configuration for the AMD8131 PCI-X Tunnel is available in the PCI-X Configuration Menu. Select a menu by highlighting it using the Arrow (↑/↓) keys and pressing Enter. The settings are described on the following pages.

```
                      BIOS Setup Utility
     Main    Advanced   PCI/PnP   Boot   Security   Chipset   Exit

  ▸ NorthBridge Configuration              Options for NB.
  ▸ HT2000 System I/O Configuration
  ▸ HT1000 South Bridge Configuration
                                           ?  ?   Select Screen
                                           ?  ?   Select Item
                                           +/-    Change Option
                                           Enter Go to Sub Screen
                                           F1    General Help
                                           F10   Save and Exit
                                           ESC  Exit
```

3.9.1 – North Bridge Chipset Configuration Sub-Menu

This menu gives options for customizing memory & Hypertransport setting s. Select a menu by highlighting it using the Arrow (↑/↓) keys and pressing Enter. The settings are described on the following pages.

```
                           BIOS Setup Utility
        Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

  NorthBridge Chipset Configuration                    ? ? Select Screen
                                                       ? ? Select Item
  ▶ Memory Configuration                               Enter Go to Sub Screen
  ▶ ECC Configuration                                  F1    General Help
  ▶ IOMMU Option  Configuration                        F10   Save and Exit
                                                       ESC  Exit
  Memory CLK                      :XXX MHz
  CAS latency (Tcl)               :XX
  RAS/CAS Delay (Trcd)            :X CLK
  Min Active RAS (Tras)           :X CLK
  Row Precharge Time (Trp) :X CLK
  RAS/RAS Delay (Trrd)            :X CLK
  Row Cycle (Trc)                 :X CLK
  Row Refresh Cycle (Trfc)        :X CLK
  Read Write Delay (Trwt)         :X CLK
  Read Preamble                   :X ns
  Asynchronous Latency            :X ns
```

Feature	Option	Description
NorthBridgeChipset Configuration		
Memory CLK	Read only	It shows the clock frequency of the installed SDRAM.
CAS Latency (Tcl)	Read only	This controls the timing delay (in clock cycles) before SDRAM starts a read command after receiving it.
RAS/CAS Delay (Trcd)	Read only	When DRAM is refreshed, both rows and columns are addressed separately. This setup item allows you to determine the timing of the transition from RAS (row address strobe) to CAS (column address strobe). The less the clock cycles, the faster the DRAM performance.

Feature	Option	Description
NorthBridgeChipset Configuration		
Min Active RAS (Tras)	Read only	This setting allows you to select the number of clock cycles allotted for the RAS pulse width, according to DRAM specifications. The less the clock cycles, the faster the DRAM performance.
Row Precharge Time (Trp)	Read only	This item controls the number of cycles for Row Address Strobe (RAS) to be allowed to precharge. If insufficient time is allowed for the RAS to accumulate its chage before DRAM refresh, refresh may be incomplete and DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system.
RAS/RAS Delay (Trrd)	Read only	Auto uses hardware compensation values. Other values add to or subtract from hardware generated value. Recommended setting is Auto.
Row Cycle (Trc)	Read only	Bits 7-4. RAS#-active to RAS#-active or auto refresh of the same bank.
Row Refresh Cycle (Trfc)	Read only	Bits 11-8. Auto-refresh-active to RAS#-active or RAS#-auto-refresh.
Read Write Delay (Trwt)	Read only	Bits 6-4. Specifies the read-to-write delay. This is not a DRAM-specified timing parameter, but must be considered due to routing latencies on the clock forwarded bus. It is counted from the first address bus slot that was not associated with part of the read burst.
Read Preamble	Read only	Bits 11-8. The time prior to the max-read DQS-return when the DQS receiver should be turned on. This is specified in units of 0.5ns. The controller needs to know when to enable its DQS receiver in anticipation of the DRAM DQS driver turning on for a read. The controller will disable its DQS receiver until the read preamble time and then enable its DQS receiver while the DRAM asserts DQS.
Asynchronous Latency	Read only	Bits 3-0. This filed should be loaded with a 4-bit value equal to the maximum asynchronous latency in the DRAM read roundtrip loop.

3.9.1.1 – Memory Configuration Sub -Menu

This menu has options for memory speed & latency. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/ -) keys to change the value of the selected option.

```
                          BIOS Setup Utility
     Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

   Memory Configuration                              MEMCLK can be set
                                                     by the code using
                                                     AUTO, or if you use
   Memclock Mode                    [Auto]           LIMIT, you can set
   MCT Timing Mode                  [Auto]           one of the standard
   User Config Mode                 [Auto]           values.
   Burst Length                     [4 Beats]
   HardWare Memory Hole             [Enabled]        ?  ?  Select Screen
                                                     ?  ?  Select Item
   CPU1 Mem DQ Driver Strength      [No Reduction]   +/-    Change Option
   CPU2 Mem DQ Driver Strength      [No Reduction]   F1     General Help
                                                     F10    Save and Exit
                                                     ESC  Exit
```

Feature	Option	Description
Memory Configuration		
Memclock Mode	Limit	MEMCLK can be set by the code using AUTO, or if you use LIMIT, you can set one of the standard values.
	Auto	
MCT Timing Mode	Manual	Allows user to configure the MCT Timing Mode manually.
	Auto	
User Config Mode	Manual	Allows user to set the User Config Mode manually.
	Auto	
Burst Length	8 Beats	Burst length can be set to 8 or 4 beats. 64 bit DQ must use 4 beats.
	4 Beats	
	2 Beats	
HardWare Memory Hole	Disabled	Allows user to enable hardware memory remapping around memory hole
	Enabled	
CPU1 Mem DQ Driver Strength CPU2 Mem DQ Driver Strength	**No Reduction**	This field controls the drive strength reduction of the Memory DQ pins.
	-15%	
	-30%	
	-50%	

3.9.1.2 –ECC Configuration Sub-Menu

   This menu allows the user to configure ECC setup for system & DRAM. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

BIOS Setup Utility						
Main	Advanced	PCI/PnP	Boot	Security	**Chipset**	Exit

ECC Configuration		DRAM ECC allows hardware to report and correct memory errors automatically maintaining system integrity.
DRAM ECC Enable	[Enabled]	
MCA DRAM ECC Logging	[Disabled]	
ECC Chip Kill	[Enabled]	
DRAM SCRUB REDIRECT DRAM	[Disabled]	
BG Scrub	[Disabled]	? ? Select Screen
L2 Cache BG Scrub	[Disabled]	? ? Select Item
Data Cache BG Scrub	[Disabled]	+/- Change Option
		F1 General Help
		F10 Save and Exit
		ESC Exit

Feature	Option	Description
ECC Configuration		
DRAM ECC Enable	**Enabled**	DRAM ECC allows hardware to report and correct memory errors automatically maintaining system integrity.
	Disabled	
MCA DRAM ECC Logging	~~Disabled~~	Enables MCA DRAM ECC Logging Reporting.
	Enabled	
ECC Chip Kill	Disabled	ECC Chip Kill
	Enabled	
DRAM SCRUB REDIRECT	**Disabled**	DRAM SCRUB REDIRECT allows the system to correct DRAM ECC errors immediately when they occur, even if background scrubbing is on.
	Enabled	
DRAM BG Scrub	**Disabled**	DRAM scrubbing corrects memory errors so later reads are correct. Doing this while memory is not being used improves performance. Note: When AMD's node interleave feature is enabled, BIOS will force DRAM scrub off.
	40ns	
	80ns	
	160ns	
	320ns	
	640ns	
	1.28us	
	2.56us	
	5.12us	
	10.2us	
	20.5us	
	41.0us	
	81.9us	
	163.8us	
	327.7us	
	655.4us	
L2 Cache BG Scrub	**Disabled**	Allows the L2 Data Cache RAM to be corrected while idle.
	40ns	
	80ns	
	160ns	
	320ns	
	640ns	
	1.28us	
	2.56us	
	5.12us	
	10.2us	
	20.5us	
	41.0us	
	81.9us	
	163.8us	
	327.7us	
	655.4us	

Feature	Option	Description
ECC Configuration		
Data Cache BG Scrub	Disabled	Allow s the L1 Data Cache RAM to be corrected while idle.
	40ns	
	80ns	
	160ns	
	320ns	
	640ns	
	1.28us	
	2.56us	
	5.12us	
	10.2us	
	20.5us	
	41.0us	
	81.9us	
	163.8us	
	327.7us	
	655.4us	

3.9.1.3 – IOMMU Configuration Sub-Menu

This menu has options for IOMMU. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

```
                          BIOS Setup Utility
     Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

   IOMMU Mode                       [Disabled]          Set GART size in
                                                        systems without AGP,
                                                        or disable altogether.
                                                        Some OSes require
                                                        valid GART for proper
                                                        operation,  If AGP is
                                                        present, select
                                                        appropriate option to
                                                        ensure proper AGP
                                                        operation.


                                                        ?  ?  Select Screen
                                                        ? ?  Select Item
                                                        +/-    Change Option
                                                        F1     General Help
                                                        F10   Save and Exit
                                                        ESC  Exit
```

Feature	Option	Description
IOMMU Configuration		
IOMMU Mode	AGP Present **Disabled** 32 MB 64 MB 128 MB 256 MB 512 MB 1 GB	Set GART size in systems without AGP, or disable altogether. Some OSes require valid GART for proper operation, If AGP is present, select appropriate option to ensure proper AGP operation.

3.9.2 – HT2000 System I/O Configuration Sub-Menu

This menu allows the user to configure HT2000 System I/O Submenu .
Use the up and down arrow (↑/↓) keys to select an item. Use the Plus
and Minus (+/-) keys to change the value of the selected option.

```
                            BIOS Setup Utility
         Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

 HT2000 Chipset  Configuration                          Enable/Disable EXB1
                                                        Split
 Split PCI-E Master 1 to  2 (x4)          [Disabled]
 Split PCI-E Master 3 to 2 (x4)           [Disabled]    ?  ?  Select Screen
                                                        ?  ?  Select Item
                                                        +/-    Change Option
                                                        F1     General Help
                                                        F10   Save and Exit
                                                        ESC  Exit
```

Feature	Option	Description
Chipset Configuration		
Split PCI-E Master 1 to 2 (x4)	Enabled	Enabled/Disable EXB1 Split
	Disabled	
Split PCI-E Master 3 to 2 (x4)	Enabled	Enabled/Disable EXB3 Split
	Disabled	

3.9.3 – HT1000 SouthBridge Chipset Configuration Sub -Menu

This menu allows the user to enable SM Bus 2.0 controller. Use the up and down arrow (↑/↓) keys to select an item. Use the Plus and Minus (+/-) keys to change the value of the selected option.

```
                        BIOS Setup Utility
    Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit

Power Control After Power Fail        [Disabled]     Enabled Former State
Resume on RTC Alarm                   [Disabled]
Resume on PME#                        [Enabled]      ? ?  Select Screen
Watchdog Timer                        [Disabled]     ? ?  Select Item
                                                     +/-    Change Option
South Bridge Chipset Configuration                   F1     General Help
                                                     F10  Save and Exit
Hide XIOAPIC PCI Functions            [Enabled]      ESC  Exit
Power Button Install Off              [Enabled]
```

Feature	Option	Description
Chipset Configuration		
Power Control After Power Fail	Former State	
	Disabled	
Resume on RTC Alarm	Enabled	
	Disabled	
Resume on PME#	**Enabled**	
	Disabled	
Watchdog Timer	Enabled	Once timer is activated, it can only be disabled by system shutdown. The timer starts down-count at the system power on.
	Disabled	

Feature	Option	Description
South ridge Chipset Configuration		
Hide XIOAPIC PCI Functions	**Enabled**	Hide XIOAPIC PCI functions.
	Disabled	
Power Button Install Off	**Enabled**	Disable or enable power button instant off.
	Disabled	

3.10 – BIOS Exit Menu

You can display an Exit BIOS Setup option by highlighting it Arrow (↑/↓) keys and pressing Enter.

```
                              BIOS Setup Utility
         Main    Advanced    PCI/PnP    Boot    Security    Chipset    Exit
       ┌──────────────────────────────────────────┬─────────────────────────┐
       │ Exit Options                              │ Exit system setup after │
       │                                           │ saving the changes.     │
       │                                           │                         │
       │ Save Changes and Exit                     │ F10 key can be used for │
       │ Discard Changes and Exit                  │ this operation.         │
       │ Discard Charges                           │                         │
       │                                           │ ? ? Select Screen       │
       │ Load Optimal Defaults                     │ ? ? Select Item         │
       │ Load Failsafe Defaults                    │ Enter Go to Sub Screen  │
       │                                           │ F1    General Help      │
       │                                           │ F10   Save and Exit     │
       │                                           │ ESC  Exit               │
       └──────────────────────────────────────────┴─────────────────────────┘
```

Save Changes and Exit
Use this option to exit setup utility and re-boot.
All new selections you have made are stored into CMOS.
System will use the new settings to boot up.

Discard Changes and Exit
Use this option to exit setup utility and re-boot.
All new selections you have made are not stored into CMOS.
System will use the old settings to boot up.

Discard Changes
Use this option to restore all new setup values that you have made but not saved into CMOS.

Load Optimal Defaults
Use this option to load default performance setup values.
Use this option when system CMOS values have been corrupted or modified incorrectly.

Load Failsafe Defaults
Use this option to load all default failsafe setup values.
Use this option when troubleshooting.

NOTE

Chapter 4: Diagnostics

Note: if you experience problems with setting up your system, always check the following things in the following order:

Memory, Video, CPU

By checking these items, you will most likely find out what the problem might have been when setting up your system. For more information on troubleshooting, check the TYAN website at: http://www.tyan.com.

4.1 Beep Codes

Fatal errors, which halt the boot process, are communicated through two kinds of audible beeps.
•A single long beep followed by two short beeps: It indicates that a video error has occurred and the BIOS can't initialize the video screen to display and additional info.
•A single long beep repeatedly: This indicates that a DRAM error has occurred.
The most common type of error is a memory error.

Before contacting your vendor or TYAN Technical Support, be sure that you note as much as you can about the beep code length and order that you experience. Also, be ready with information regarding add -in cards, drives and O/S to speed the support process and come to a quicker solution.

4.2 Flash Utility

Every BIOS file is unique for the motherboard it was designed for. For Flash Utilities, BIOS downloads, and information on how to properly use the Flash Utility with your motherboard, please check the TYAN web site:
http://www.tyan.com/

Note: Please be aware that by flashing your BIOS, you agree that in the event of a BIOS flash failure, you must contact your dealer for a replacement BIOS. There are no exceptions. TYAN does not have a policy for replacing BIOS chips directly with end users. In no event will TYAN be held responsible for damages done by the end user.

4.3 AMIBIOS Post Code

The POST code checkpoints are the largest se t of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS:

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT 09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the sy stem that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.

Checkpoint	Description
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).

NOTE

Appendix I: SMDC Information

Overview

Tyan Server Management Daughter Card (SMDC) is a powerful yet cost-efficient solution for high-end server management hardware packages. Tyan's goal is to provide remote system monitoring and control even when the operating system is absence or simply fails. This empowers Tyan's server board with advanced industrial-standard features.

Tyan SMDC is a snap-in card that provides essential server management solution. It enables any IT Manager by providing multi-interfaces to access the hardware remotely and perform **monitor**, **control** and **diagnose** activities effectively.

Tyan SMDC is not a peripheral card. Unlike regular peripheral card such as AGP card, Network card or SCSI card, SMDC does not require any hardware specific driver. As long as a standby power comes into the system, SMDC will begin looking after the system.

Tyan SMDC provides diversified methods to communicate with the hardware. IT manager has the flexibility to choose among *Keyboard Controller Style* (KCS), *Block Transfer* (BT) style, Intelligent Chassis Management Bus (ICMB), Intelligent Platform Management Bus (IPMB), Emergency Management Port (EMP) and standard IPMI-Over-LAN communication as defined in latest IPMI 1.5 specification.

Tyan SMDC is compatible with all IPMI-compliance software as well as Tyan System Operator™ (TSO) software package.

By adding SMDC, Tyan's server board becomes a highly manageable and IPMI compatible system with all the advanced features suggesting in IPMI Spec.

More detailed information on Tyan's SMDC card can be found on our website: http://www.tyan.com

Features of Tyan Server Management

Monitor various system components remotely
-such as fans, processor temperature, and more

Remote power on and power off

Console redirect
-the ability to view system remotely

Alert and error actions
-such as audible beep, e-mail, power down and reboot

SMDC runs on stand-by power
-the SMDC will continue to function, even if the system is
not powered on

How SMDC and TSO Work

The brief descriptions below will help explain how these items function.

	Agent – a system with SMDC installed The SMDC is installed i n the Agent system that uses a compatible/supported Tyan motherboard.
	Manager – manages the Agent The Manger is set up to manage the Agent that has the SMDC. The Manager and Agent should be located in the same place.
	Console – communicates with Manager The Console is used to monitor and control the Agent through the Manager.

Appendix II: How to Make a Driver Diskette

Follow the steps below to make a driver diskette from the TYAN driver CD provided.

1. Start the system and insert the TYAN CD into the CD-ROM drive to boot from CD. You will see the following menu. Then press [1] and [Enter] to boot the system to TYAN diskette maker. (If you would like to boot from hard disk, press 0 and Enter or just wait for 10 seconds to boot automatically from hard disk.).

```
Boot from CD:

ISOLINUX 2.00 2002-10-25  Copyright (C) 1994-2002 H. Peter Anvin
0) Boot from first hard drive
1) Boot to TYAN diskette maker
boot: 1_
```

2. Choose the chipset vender which you need from the main menu.

```
                    TYAN Driver Diskette Maker V1.0


                          ** Main Menu**
                      ====Choose Chipset Vendor====
        01          Adaptec
        02          Intel
        03          LSI
        04          nVidia
        05          Promise
        06          Silicon Image
        07          VIA


                    EXIT
```
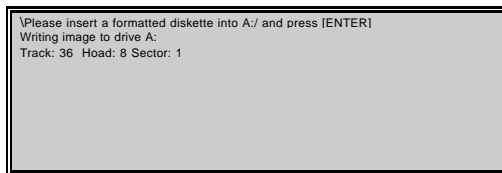
3. The following picture pops up after selecting the chipset model.

```
TYAN Driver Diskette Maker

                     ** nVidia**
              ====Choose Chipset Model====
   01      nVidia NVRAID


           EXIT
```
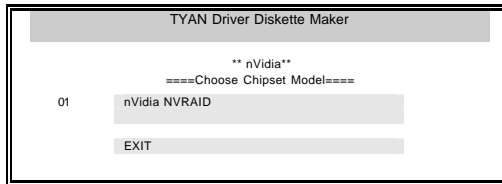
4. After selecting the chipset model, select the OS to start the diskette making.

```
TYAN Driver Diskette Maker

              ====nVidia NVRAID SATA and RAID Driver====

Diskette =01=    Microsoft Windows 2000 32-bit
Diskette =02=    Microsoft Windows XP 32-bit
Diskette =03=    Microsoft Windows XP 64bit
Diskette =04=    Microsoft Windows 2003 64-bit

                 Back
```
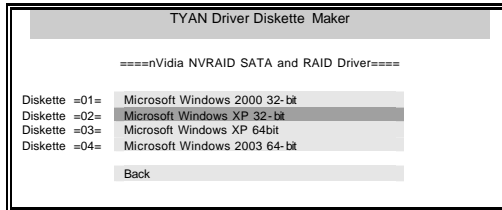
5. Follow the instruction on menu to insert a diskette and press [ENTER].

```
\Please insert a formatted diskette into A:/ and press [ENTER]
Writing image to drive A:
Track: 36  Hoad: 8 Sector: 1
```

6. Using "ESC" key to quit the TYAN diskette maker. The system will automatically restart.

Glossary

ACPI (Advanced Configuration and Power Interface): a power management specification that allows the operating system to control the amount of power distributed to the computer's devices. Devices not in use can be turne d off, reducing unnecessary power expenditure.

AGP (Accelerated Graphics Port): a PCI-based interface which was designed specifically for demands of 3D graphics applications. The 32 -bit AGP channel directly links the graphics controller to the main memory . While the channel runs only at 66 MHz, it supports data transmission during both the rising and falling ends of the clock cycle, yielding an effective speed of 133 MHz.

ATAPI (AT Attachment Packet Interface): also known as IDE or ATA; a drive implementation that includes the disk controller on the device itself. It allows CD-ROMs and tape drives to be configured as master or slave devices, just like HDDs.

ATX: the form factor designed to replace the AT form factor. It improves on the AT design by rotating the board 90 degrees, so that the IDE connectors are closer to the drive bays, and the CPU is closer to the power supply and cooling fan. The keyboard, mouse, USB, serial, and parallel ports are built -in.

Bandwidth: refers to carrying capacity. The greater the bandwidth, the more data the bus, phone line, or other electrical path can carry. Greater bandwidth results in greater speed.

BBS (BIOS Boot Specification): a feature within the BIOS that creates, prioritizes, and maintains a list of all Initial Program Load (IPL) devices, and then stores that list in NVRAM. IPL devices have the ability to load and execute an OS, as well as provide the ability to return to the BIOS if the OS load process fails. At that point, the next IPL device is called upon to attempt loading of the OS.

BIOS (Basic Input/Output System): the program that resides in the ROM chip, which provides the basic instructions for controlling your computer's hardware. Both the operating system and application software use BIOS routines to ensure compatibility.

Buffer: a portion of RAM which is used to temporarily store data; usually from an application though it is also used when printing and in most keyboard drivers. The CPU can manipulate data in a buffer before copying it to a disk drive. While this improves system performance (reading to or writing from a disk drive a single time is much faster than doing so repeatedly) there is the possibility of

losing your data should the system crash. Information in a buffer is temporarily stored, not permanently saved.

Bus: a data pathway. The term is used especially to refer to the connection between the processor and system memory, and between the processor and PCI or ISA local buses.

Bus mastering: allows peripheral devices and IDEs to access the system memory without going through the CPU (similar to DMA channels).

Cache: a temporary storage area for data that will be needed often by an application. Using a cache lowers data access times since the information is stored in SRAM instead of slower DRAM. Note that the cache is also much smaller than your regular memory: a typical cache size is 512KB, while you may have as much as 4GB of regular memory.

Closed and open jumpers: jumpers and jumper pins are active when they are "on" or "closed", and inactive when they are "off" or "open".

CMOS (Complementary Metal-Oxide Semiconductors): chips that hold the basic startup information for the BIOS.

COM port: another name for the serial port, which is called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another). Parallel ports transmit the bits of a byte on eight different wires at the same time (that is, in parallel form, eight bits at the same time).

DDR (Double Data Rate): a technology designed to double the clock speed of the memory. It activates output on both the rising and falling edge of the system clock rather than on just the rising edge, potentially doubling output.

DIMM (Dual In-line Memory Module): faster and more capacious form of RAM than SIMMs, and do not need to be installed in pairs.

DIMM bank: sometimes called DIMM socket because the physical slot and the logical unit are the same. That is, one DIMM module fits into one DIMM socket, which is capable of acting as a memory bank.

DMA (Direct Memory Access): channels that are similar to IRQs. DMA channels allow hardware devices (like soundcards or keyboards) to access the main memory without involving the CPU. This frees up CPU resources for other tasks. As with IRQs, it is vital that you do not double up devices on a single line. Plug-n-Play devices will take care of this for you.

DRAM (Dynamic RAM): widely available, very affordable form of RAM whi ch looses data if it is not recharged regularly (every few milliseconds). This refresh requirement makes DRAM three to ten times slower than non -recharged RAM such as SRAM.

ECC (Error Correction Code or Error Checking and Correcting): allows data to be checked for errors during run -time. Errors can subsequently be corrected at the same time that they're found.

EEPROM (Electrically Erasable Programmable ROM): also called Flash BIOS, it is a ROM chip which can, unlike normal ROM, be updated. This allows you to keep up with changes in the BIOS programs without having to buy a new chip. TYAN's BIOS updates can be found at http://www.tyan.com

ESCD (Extended System Configuration Data): a format for storing information about Plug-n-Play devices in the system BIOS. This information helps properly configure the system each time it boots.

Firmware: low-level software that controls the system hardware.

Form factor: an industry term for the size, shape, power supply type, and external connector type of the Personal Computer Board (PCB) or motherboard. The standard form factors are the AT and ATX.

Global timer: onboard hardware timer, such as the Real -Time Clock (RTC).

HDD: stands for Hard Disk Drive, a type of fixed drive.

H-SYNC: controls the horizontal synchroni zation/properties of the monitor.

HyperTransport^{TM}: a high speed, low latency, scalable point -to-point link for interconnecting ICs on boards. It can be significantly faster than a PCI bus for an equivalent number of pins. It provides the bandwidth and fl exibility critical for today's networking and computing platforms while retaining the fundamental programming model of PCI.

IC (Integrated Circuit): the formal name for the computer chip.

IDE (Integrated Device/Drive Electronics): a simple, self-contained HDD interface. It can handle drives up to 8.4 GB in size. Almost all IDEs sold now are in fact Enhanced IDEs (EIDEs), with maximum capacity determined by the hardware controller.

IDE INT (IDE Interrupt): a hardware interrupt signal that goes to the IDE .

I/O (Input/Output): the connection between your computer and another piece of hardware (mouse, keyboard, etc.)

IRQ (Interrupt Request): an electronic request that runs from a hardware device to the CPU. The interrupt controller assigns priorities to incoming requests and delivers them to the CPU. It is important that there is only one device hooked up to each IRQ line; doubling up devices on IRQ lines can lock up your system. Plug-n-Play operating systems can take care of these details for you.

Latency: the amount of time that one part of a system spends waiting for another part to catch up. This occurs most commonly when the system sends data out to a peripheral device and has to wait for the peripheral to spread (peripherals tend to be slower than onboard system components).

NVRAM: ROM and EEPROM are both examples of Non-Volatile RAM, memory that holds its data without power. DRAM, in contrast, is volatile.

Parallel port: transmits the bits of a byte on eight different wires at the same time.

PCI (Peripheral Component Interconnect): a 32 or 64-bit local bus (data pathway) which is faster than the ISA bus. Local buses are those which operate within a single system (as opposed to a network bus, which connects multiple systems).

PCI PIO (PCI Programmable Input/Output) modes: the data transfer modes used by IDE drives. These modes use the CPU for data transfer (in contrast, DMA channels do not). PCI refers to the type of bus used by these modes to communicate with the CPU.

PCI-to-PCI bridge: allows you to connect multiple PCI devices onto one PCI slot.

Pipeline burst SRAM: a fast secondary cache. It is used as a secondary cache because SRAM is slower than SDRAM, but usually larger. Data is cached first to the faster primary cache, and then, when the primary cache is full, to the slower secondary cache.

PnP (Plug-n-Play): a design standard that has become ascendant in the industry. Plug-n-Play devices require little set-up to use. Devices and operating systems that are not Plug-n-Play require you to reconfigure your system each time you add or change any part of your hardware.

PXE (Preboot Execution Environment): one of four components that together make up the Wired for Management 2.0 baseline specification. PXE was designed to define a standard set of preboot protocol services within a client with the goal of allowing networked-based booting to boot using industry standard protocols.

RAID (Redundant Array of Independent Disks): a way for the same data to be stored in different places on many hard drives. By using this method, the data is stored redundantly and multiple hard drives will appear as a single drive to the operating system. RAID level 0 is known as striping, where data is striped (or overlapped) across multiple hard drives, but offers no fault-tolerance. RAID level 1 is known as mirroring, which stores the data within at least two hard drives, but does not stripe. RAID level 1 also allows for faster access time and fault-tolerance, since either hard drive can be read at the same time. RAID level 0+1 is both striping and mirroring, providing fault-tolerance, striping, and faster access all at the same time.

RAIDIOS: RAID I/O Steering (Intel)

RAM (Random Access Memory): technically refers to a type of memory where any byte can be accessed without touching the adjacent data and is often referred to the system's main memory. This memory is available to any program running on the computer.

ROM (Read-Only Memory): a storage chip which contains the BIOS; the basic instructions required to boot the computer and start up the operating system.

SDRAM (Synchronous Dynamic RAM): called as such because it can keep two sets of memory addresses open simultaneously. By transferring data alternately from one set of addresses and then the other, SDRAM cuts down on the delays associated with non-synchronous RAM, which must close one address bank before opening the next.

Serial port: called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another).

SCSI Interrupt Steering Logic (SISL): Architecture that allows a RAID controller, such as AcceleRAID 150, 200 or 250, to implement RAID on a system board-embedded SCSI bus or a set of SCSI busses. SISL: SCSI Interrupt Steering Logic (LSI) (only on LSI SCSI boards)

Sleep/Suspend mode: in this mode, all devices except the CPU shut down.

SDRAM (Static RAM): unlike DRAM, this type of RAM does not need to be refreshed in order to prevent data loss. Thus, it is faster and more expensive.

Standby mode: in this mode, the video and hard drives shut down; all other devices continue to operate normally.

UltraDMA -33/66/100: a fast version of the old DMA channel. UltraDMA is also called UltraATA. Without a proper UltraDMA controller, your system cannot take advantage of higher data transfer rates of the new UltraDMA/UltraATA hard drives.

USB (Universal Serial Bus): a versatile port. This one port type can function as a serial, parallel, mouse, keyboard or joystick port. It is fast enough to support video transfer, and is capable of supporting up to 127 daisy-chained peripheral devices.

VGA (Video Graphics Array): the PC video display standard

V-SYNC: controls the vertical scanning properties of the monitor.

ZCR (Zero Channel RAID): PCI card that allows a RAID card to use the onboard SCSI chip, thus lowering cost of RAID solution

ZIF Socket (Zero Insertion Force socket): these sockets make it possible to insert CPUs without damaging the sensitive CPU pins. The CPU is lightly placed in an open ZIF socket, and a lever is pulled down. This shifts the processor over and down, guiding it into the board and locking it into place.

Technical Support

If a problem arises with your system, you should turn to your dealer for help first. Your system has most likely been configured by them, and they should have the best idea of what hardware and software your system contains. Furthermore, if you purchased your system from a dealer near you , you can bring your system to them to have it serviced instead of attempting to do so yourself (which can have expensive consequences).

If these options are not available for you then Tyan Computer Corporation can help. Besides designing innovative and quality products for over a decade, Tyan has continuously offered customers service beyond their expectations. Tyan's website (**www.tyan.com**) provides easy-to-access resources such as in-depth Linux Online Support sections with downloadable Linux drivers a nd comprehensive compatibility reports for chassis, memory and much more. With all these convenient resources just a few keystrokes away, users can easily find the latest software and operating system components to keep their systems running as powerful and productive as possible. Tyan also ranks high for its commitment to fast and friendly customer support through email. By offering plenty of options for users, Tyan serves multiple market segments with the industry's most competitive services to support them.

"Tyan's tech support is some of the most impressive we've seen, with great response time and exceptional organization in general" - Anandtech.com

Please feel free to contact us directly for this service at
techsupport@tyan.com

Help Resources:
> 1. See the beep codes section of this manual.
> 2. See the TYAN website for FAQ's, bulletins, driver updates, and other information: http://www.tyan.com
> 3. Contact your dealer for help BEFORE calling TYAN.
> 4. Check the TYAN user group:
> alt.comp.periphs.mainboar d.TYAN

Returning Merchandise for Service

During the warranty period, contact your distributor or system vendor FIRST for any product problems. This warranty only covers normal customer use and does not cover damages incurred during shipping or failure d ue to the alteration, misuse, abuse, or improper maintenance of products.

NOTE: A receipt or copy of your invoice marked with the date of purchase is required before any warranty service can be rendered. You may obtain service by calling the manufacturer for a Return Merchandise Authorization (RMA) number. The RMA number should be prominently displayed on the outside of the shipping carton and the package should be mailed prepaid. TYAN will pay to have the board shipped back to you.

Notice for the USA
Compliance Information Statement (Declaration of Conformity Procedure) DoC
FCC Part 15: This device complies with part 15 of the FCC Rules

Operation is subject to the following conditions:

This device may not cause harmful interference, and
This device must accept any interference received including interference that may cause undesired operation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

Reorient or relocate the receiving antenna.
Increase the separation between the equipment and the receiver.
Plug the equipment into an outlet on a circuit different from that of the receiver.
Consult the dealer on an experienced radio/television technician for help.

Notice for Canada
This apparatus complies with the Class B limits for radio interference as specified in the Canadian Department of Communications Radio Interference Regulations. (Cet appareil est conforme aux norms de Classe B d'interference radio tel que specifie par le Ministere Canadien des Communications dans les reglements d'ineteference radio.)

Notice for Europe (CE Mark)
This product is in conformity with the Council Directive 89/336/EEC, 92/31/EEC (EMC).

CAUTION: Lithium battery included with this board. Do not puncture, mutilate, or dispose of battery in fire. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by manufacturer. Dispose of used battery according to manufacturer instructions and in accordance with your local regulations.

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